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Original Contributions.

TREATMENT OF LOOSENED TEETH.

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No departure from a physiologic condition of the mouth is so readily noticed by the sufferer as a tooth which has become more or less loosened in its alveolar socket. In considering this abnormal condition of the teeth, two classes may be distinguished:

First. Those cases resulting from infection which has caused pus to spread in such a manner as to interfere with the pericemental attachment of the root to the alveolus. In such cases, more or less speedy removal of the focus of infection will generally restore the tooth to its normal degree of solidity. Infection following a dying pulp, difficult erupting teeth, ligatures accidentally left around the necks of teeth, ill-advised separating of teeth and other injudicious dental operations are the most common causes in this class, and, therefore, they can be strictly classified as localized diseases, readily cured if the cause is ascertained and removed.

Second. Those cases in which necrotic conditions prevail and the tooth becomes gradually less firm in its socket as it loses more and more of its peridental attachment. These abnormal conditions are the gradual results of some form of malnutrition, and consequently are not so readily amenable to treatment.

ETIOLOGY.

It follows as a natural result that, in order to treat a loosened tooth in a rational manner, the first thing is to make a correct diagnosis of the etiology of a given case. Every practitioner has

his "red letter" cases among his records of very loose teeth, cured by the removal of a suppurating pulp; cases which have been brought to him after some worthy colleague has given up the case in despair; having erroneously treated as a pyorrheal pocket an ordinary alveolar abscess. Lest we find ourselves in the same class at some time or other, let us beware of hasty opinions of any case of suppuration. The etiology of some cases is more difficult to diagnose than that of others and often it will take the most careful differential diagnosis to reveal the true condition of affairs.

EXAMINATION OF THE TEETH.

The first thing in such an examination is to determine whether or not there are any gingival pockets, and if so, how far they extend toward the end of the root, and in many cases, when the pockets are very extensive, to determine how much peridental attachment is left. For this purpose, the pockets should be carefully sprayed with some sterilizing solution, and the examination is then best made by means of a very thin flat right angle burnisher. When the pocket extends completely from the gingiva all the way around the very apex of the root, it is generally safe to assume that there is no vitality left in the pulp of the tooth and it becomes the first duty of the operator to enter the pulp cavity of such a tooth and to remove every portion therefrom. When these pockets are of a very insignificant depth and often not at all perceptible as real pockets, the question as to the condition of the pulp is a more serious one. Recourse can now be had to the different means at our disposal of testing for pulp vitality by thermal and electric effects. This, however, is not always satisfactory. The condition of occlusion of the particular tooth is an important matter for consideration. It is not uncommon to find a pericementitis set up, followed by the loosening of a tooth which has all the strain of occlusion of the entire jaw centered on it, caused, perhaps, by some recent filling which has not been sufficiently ground away. It should be remembered that, in an acute inflammation of a loosened tooth, there is apt to be at times some protrusion of the tooth itself from the socket. This in itself will produce a stress of occlusion at this particular point, and while it has become a detrimental factor, care should be taken not to confound it with the original cause of the trouble.

THE USE OF THE ROENTGEN RAYS.

Since the advent of the Roentgen ray in practice, it has been found of great aid in diagnosing pathologic conditions, both in the pulp and around the roots of the teeth. Whenever there is any doubt on the subject of the vitality of the pulp it is almost imperative at the present day to have a radiograph made of the part involved. For this purpose the film should be small enough to embrace only two or three teeth adjoining the affected one, for the purpose of obtaining a picture as free from distortion as possible. In a number of cases of loosened teeth, in which all the former methods of examination have proved unsatisfactory, a radiograph will frequently show the outlines of a well-defined abscess in the vicinity of the apex of the root. Whenever this pericemental abscess is found it is useless to attempt to treat it without thoroughly removing the pulp contents, for it is not an uncommon thing to find vitality still remaining in the pulps of such teeth. The results of the examination and treatment in many such cases lead me to form the opinion that it is only a question of time before the infected zone will cut off the vitality of the pulp and all this material become added fuel to the inflammatory fires raging in this locality. If this conclusion is based on the results of correct observation, it follows as a natural conclusion that it is a wise thing to remove such pulp aseptically before it has been reached by the infected material.

In many cases in which there is no question of the pulp having lost its vitality, it is impossible to determine from ordinary observation whether such a dead pulp has been removed by a previous operator, and, if removed, whether the root has been properly filled. For this purpose the radiograph is also a very valuable aid, as, under proper conditions, it will disclose the evidence of most of the generally used methods of root filling and by this means can be ascertained whether the root canal has been thoroughly filled or not. In the same manner, when suspicion exists of the penetration of the antrum by the root of a tooth, a radiograph showing the same is of value in corroborating the diagnosis.

It is not an easy matter to read a radiograph correctly. The practitioner starting to use this diagnostic field must make up his mind to study the pictures carefully at the beginning, or he will be liable to form false deductions from what he thinks he sees.

This is most apparent in a picture of an upper molar, when frequently the floor of the antrum dips down between the lingual and buccal roots. The radiograph will show the floor of the antrum well defined, and apparently all the roots of the tooth penetrating the same. The result will be that the beginner will suppose that all the upper molars which he examines have their roots penetrating the antrum. In the same way there are root-filling materials which will not appear in a radiograph. Later I will show a slide of an upper bicuspid, the canal of which appears not to have been filled. On entering this root canal it was found to be filled with cotton to the very end. This particular root had given no trouble for over twenty years, and during this time the tooth had never been disturbed. An examination showed a well-defined pericemental abscess and slight absorption around the end of the root, and yet this cotton was found free from odor or taint of infection, it being, in fact, the only root filling of cotton that ever came under my observation that appeared to the eye to be in anything like a sterile condition. The patient had commenced to suffer from pain around the end of the root, due undoubtedly to the abscessed area in this locality, and this caused the taking of the radiograph which plainly showed the seat of trouble. The picture was read incorrectly, as it led to the false inference that the canal was unfilled. This case is dwelt on to some extent, because it illustrates so forcibly that the radiograph, while of great value as an aid in diagnosis, cannot be absolutely depended on; consequently, this drawback should never be lost sight of by the careful diagnostician.

There are a large number of traumatisms coming under the head of the first class cases, producing pericementitis, which will be often followed by considerable loosening of the tooth. In such cases a good radiograph is of inestimable value, inasmuch as it will show up, generally speaking, an entirely healthy field, so far as the alveolar socket is concerned. This will indicate that, with proper treatment, the tooth will return to its normal condition, and at any rate delay is indicated so far as any active operative measures are concerned.

In the second class of cases in which malnutrition under some of its manifold and devious methods is playing havoc with the nutritive supply around the alveolar sockets, the consensus of

opinion at the present time appears to be that in all such cases the pulp has ceased to retain its physiologic characteristics. Lack of time prevents a proper consideration of the details of this subject. It can be stated that the removal of all such pulps is a well-recognized and satisfactory form of treatment; whenever it is feasible every vestige of pulp tissue should be removed to the very end of the different roots. To this end the original radiograph will be found of great service as a guide to the operator while removing the pulp tissue.

It is best perhaps to state that in all these cases every particle of deposit and foreign matter has been carefully removed, the surfaces of the teeth have been thoroughly polished and the pockets treated both surgically and therapeutically. The patient is instructed to brush his teeth and gums carefully four times a day, and this frequent massaging of the gums has a very invigorating influence on the capillary circulation. The teeth are to be retreated at the expiration of three or four weeks. In addition to this massage of the gums by the use of the tooth brush in the patient's hand, the therapeutic use of the Roentgen ray has been more or less advocated during the past two years. It has not been in use long enough for us to form a positive view as to its real value. There is a strong unanimity of opinion among careful observers that in many cases it has exerted a very favorable influence toward an improved nutritional condition. But its use for this purpose has been mostly of an empirical nature, and on this account it is necessary to advise great caution. No absolute definition of the means by which a circulatory condition is improved from the use of the X-ray has been discovered. It is a well-known fact that in all investigations the X-ray has shown no germicidal properties. The general belief is that the circulatory corpuscles are stimulated to a great degree, and yet this is a very indefinite statement. Furthermore, it is necessary to use the X-ray with great care and caution on account of the liability of inflammation arising from a too prolonged application. Its use might be safely started with the application of a strength of five amperes at a distance of about twelve inches. The length of time of the exposure can be safely started at about one and a half minutes and gradually increased according to the judgment of the operator. The high frequency current in various forms

is also used for this purpose and has the one advantage that it appears to lack the dangerous qualities inherent in the Roentgen ray.

OTHER METHODS OF TREATMENT.

Frequently, treatment of this nature will suffice to cause sufficient repair to the deteriorated tissues so that the tooth will again become firm in its socket. In order to accomplish this result, it is essential to remember that every possible pus focus must be removed and one of these foci that frequently escapes the observer is a root of one of the multirooted teeth that has lost its entire attachment and is absolutely a necrotic appendage to the rest of the tooth. Such a root must invariably be amputated and removed in order to remove from the field permanently every possible focus of infection. After such a necrosed tooth has been removed, the best results can only be attained by replacing it with a porcelain substitute, the technic of which I have described elsewhere (*Items of Interest,* Feb., 1904, and *Dental Cosmos,* Sept., 1902). After a trial of more than seven years it can be safely asserted that this operation is a very valuable means for the preservation and tightening of loosened teeth. About 85 per cent of the cases operated on have resulted favorably; considering the fact that some of the cases were experimental, the results achieved are very satisfactory.

A tooth that is loose and wobbly is only a source of discomfort and the irritating nature of such a tooth materially tends to increase the unhealthy condition of its own environment. A tooth in such a condition should either be removed, or, if saved, it must be placed in such a state that it will cease to be a source of discomfort and irritation. When the different methods of treatment previously outlined have failed, there remains the last resource of uniting loosened teeth to each other, or to teeth which are in a healthy condition. This operation (*Dental Cosmos,* March, 1888, and *Id.,* May, 1903) has been found invariably successful in the retention of teeth that seemed doomed to the forceps.

The one thing to remember in the treatment of all the loose teeth of the second class is that after the mouth has been made comparatively comfortable and the loosened teeth firm, this condition can only be maintained by careful prophylactic treatment once every month at the hands of the dentist and dental nurse.

INTERSTITIAL GINGIVITIS DUE TO AUTOINTOXICATION AS INDICATED BY THE URINE AND BLOOD PRESSURE DIAGNOSIS.

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In a former paper, "Interstitial Gingivitis Due to Autointoxication," I discussed etiology; in my work on "Interstitial Gingivitis or So-called Pyorrhea Alveolaris," I demonstrated the pathology; in this paper I propose to discuss the methods of diagnosis of interstitial gingivitis. It has been demonstrated that this disease originates from autointoxication. It is justifiable then to state that interstitial gingivitis is dependent upon the circulation and the vasomotor system. It is then a profitable subject for investigation. Before discussion of this phase of the subject it is necessary to become familiar with the structures involved, which, in themselves, are unique. There are no other structures in the human body like them. I have gone into details many times in a description of these structures. I will now discuss them in a general way only. The alveolar process is a bony structure intended to hold the teeth in position, and as the process absorbs, when the teeth are removed, it is, therefore, a transitory structure. In the evolution of the head, face, jaws and teeth, the process, including the jaws, grow smaller, the teeth and process change shape, making the alveolar process doubly transitory. Transitory structures are more easily involved by disease than any other. Some of the lower vertebrates shed their teeth continuously. A tooth comes into place, is used a short time, is shed and a new one takes its place. This continues throughout the life of the animal. Man has two sets. He sheds the first after it has performed its functions, and a new set takes its place. As soon as the alveolar process has developed about the teeth, a low form of inflammation sets up absorption. I have called this osteomalacia or senile absorption. This form of absorption will continue until the teeth loosen and drop out or are

extracted. It is an atavistic process. The alveolar process is an end organ. The tooth so far as the process is concerned is a foreign body. The arteries, capillaries and nerves pass through the bony process and stop.

There are other end organs in the body, chief of which are the kidneys, the eye and the brain. Physicians claim, and rightly, that because these are end organs they are more easily involved in disease, and are often the determining factors of kidney lesions. Alfred C. Croftan (*The Alkaloidal Clinic*, July, 1905) says, "It is not surprising to find that particularly those organs that are supplied by end arteries are chiefly involved, for in them vascular disturbances must first produce nutritional derangement. Chief among the organs supplied by end arteries are precisely, the kidneys, the retina and the brain and I think this explains the frequent involvement of the kidneys, eyes and brain in Bright's disease. The fact that the retina and the brain are often found injured before the kidneys, that cases of Bright's disease run their fatal course occasionally with practically no renal changes, but with serious apoplectiform brain lesions and retinitis, bears out this conception and constitutes a valid argument against the common belief that the nephritis is the primary event and the determining phenomenon of the disease."

A marked difference exists between the kidney, eye and brain as end organs and the alveolar process as an end organ. This difference is the important point in the study of interstitial gingivitis. End arteries running into the kidney, eye and brain, owing to the soft nature of these tissues, are given a chance to expand, permitting, in a measure, the blood to flow more easily, thus prolonging the tendency to disease. On the other hand, blood vessels extending throughout the alveolar process in a tortuous manner cannot expand, and, as a result, blood charged with toxins and subject to cardio-vascular changes immediately sets up irritation and inflammation which results in dilatation, bone absorption and arterial degeneration. These changes therefore will occur much earlier in the alveolar process than in other end organs.

It is apparent to every physician in the more marked systemic disturbances such as scurvy, malaria, drug poisoning, constitutional disease, etc., that the gums and alveolar process are symp-

tomatic and are watched with greatest care. The severity of the disease, as well as its progress, may often be determined by a careful scrutiny of these tissues. The more obscure and simple etiologic factors are to be considered at this time. The pathology is the same whether the cause is mild or severe.

In tracing the etiology of this disease it is at once observed that as one grows older the milder forms of this disease become more severe. Every individual has interstitial gingivitis to a greater or less extent. We are able, therefore, to immediately arrive at its etiology, viz., autointoxication due to want of proper elimination. James Tyson, *"Treatise on Bright's Disease and Diabetes,"* 1881, page 264, says: "A spongy state of the gums, with recession and excavation, are sometimes present, resulting in extreme cases in absorption of the alveolar process and falling out of the teeth." The excretory organs of the body weaken and become senile. As age advances, the kidneys and bowels fail to perform their functions properly. We are conscious, therefore, of self-poisoning by the odor exhaled from the lungs and bodies and the accumulation of gases in the gastro-intestinal tract. The effect, through the blood, of autointoxication upon the gums and alveolar processes direct, producing interstitial gingivitis, together with the peculiar odor from the lungs and body, are, to the expert, valuable early signs of more grave lesions about to occur in the heart, the arterial systems throughout the body but more especially in the kidneys.

For the past ten years I have given special study to the constitutional condition of interstitial gingivitis as indicated by the urine, the only means at hand of ascertaining the general condition of the system. The cases I wish to report are the first fifty ranging from twenty-seven to sixty-seven years of age. All had interstitial gingivitis in its most aggravated form, with loose teeth in varying numbers. Thirty-two had lost teeth as a result of the disease. Fourteen had pyorrhea alveolaris that could be observed by the naked eye. The teeth were cleaned. The loose teeth were either extracted or fastened to other teeth. Twenty-four hours' urine was obtained. A part or all was sent to the Columbus Medical Laboratory for examination. In tabulating the reports, the following results were obtained. Specific gravity —two had 1.005; two, 1.006; two, 1.007; two, 1.008; two, 1.009;

one, 1.010; one, 1.011; one, 1.012; two, 1.013; six, 1.014; one, 1.015; five, 1.016; two, 1.017; one, 1.018; five, 1.020; three, 1.023; one, 1.024; three, 1.025; one, 1.026; two, 1.027; one, 1.028; two, 1.029; one, 1.031. There were granular casts in six reports; hyaline casts in twelve; cylindroid in twenty-two. Degree of acidity showed—one had 11 degrees; two, 12; one, 14; two, 15; one, 16; two, 17.5; four, 20; one, 22; one, 24; five, 30; seven, 36; two, 40; two, 44; one, 46; two, 56; one, 58; one, 59; one, 60; two, 62. The urea showed two had .3 per cent; one, .5; two, .6; two, .7; two, .9; two, 1; one, 1.1; two, 1.3; one, 1.4; four, 1.5; six, 1.6; one, 1.7; three, 1.8; one, 1.9; one, 2; three, 2.1; three, 2.2; two, 2.4; six, 2.5; two, 2.6; one, 3; one, 3.1; one, 7.1. Albumin was found in four cases; blood in six; leucocytes in forty-five; epithelial cells in forty-six; uric acid crystals in two; urates in five; oxalates in fifteen. *Indican was present in every case.* To make a more complete study of each individual case, the following table has been prepared:

Specific Gravity.	Casts, Granular.	Hyaline.	Cylindroid.	Acid— Degree	Urea— Per cent.
23	0	0	0	60	2.5
20	1	1	1	56	2.5
8	0	0	1	20	1.
6	0	1	1	12	.6
12	0	0	0	36	1.5
31	0	0	0	44	2.6
29	1	1	1	46	2.2
16	1	1	1	52	2.2
11	0	0	1	17.5	1.4
17	0	0	0	17.5	1.6
27	0	1	1	62	2.1
20	0	0	1	24	2.2
25	0	1	0	44	2.4
9	0	0	1	16	1.5
25	1	1	1	40	3.1
29	1	1	0	58	2.6
14	0	0	0	36	2.
16	0	0	0	30	1.8
14	0	0	0	30	1.5
13	0	0	0	36	1.6
13	0	0	0	36	1.6
15	0	0	0	36	1.7
15	0	0	1	15	1.6
14	0	0	0	36	.9
28	0	0	0	36	3.
5	0	0	0	degree not taken	.3
16	0	0	0	"	1.6
20	0	0	0	"	1.5
10	0	0	0	"	1.1
25	0	0	1	"	2.5

Specific Gravity.	Casts, Granular.	Hyaline.	Cylindroid.	Acid— Degree.	Urea— Per cent.
27	0	1	1	62	2.1
25	0	0	0	degree not taken	2.5
14	0	0	1	30	1.3
20	0	0	0	degree not taken	1.9
24	0	0	1	"	2.4
26	0	0	0	"	2.1
18	0	1	1	"	1.6
14	0	0	1	30	1.8
5	0	0	0	15	.7
23	0	0	1	40	1.8
7	0	0	0	14	1.3
16	0	0	0	30	1.8
9	0	0	1	11	.9
14	0	0	1	22	1.5
7	0	0	0	20	.7
7	0	0	0	20	7.1
23	0	0	0	60	2.5
20	1	1	1	56	2.5
8	0	0	0	20	1.0
6	0	1	1	12	.6

TOTAL EXAMINATION OF URINE.

QUALITATIVE EXAMINATION.

Physical condition:
- Clear 17
- Cloudy 33

Reaction:
- Acid 46
- Alkaline 4

Color:
- Yellow 46
- Amber 4

Odor:
- Negative 46
- Present 4

Mucin:
- Present 30
- Absent 20

Albumin:
- Present, trace 4
- Absent 46

Peptones .....None

Sugar .....None

Bile .....None

Blood:
- Present 6
- Absent 44

Indican 50

MICROSCOPICAL EXAMINATION.

Casts:
- Hyaline 14
- Granular 7
- Epithelial 1
- Cylindroids 21

Cells:
- Blood 4
- Leucocytes 45
- Pus 11
- Epithelial cells 46

Crystals:
- Uric acid 2
- Urates 5
- Oxalates 15

Phosphates:
- Calcium 1

These tables indicate either renal insufficiency, or excessive suboxidation products, producing renal strain. In cases in which the degree of acidity exceeds forty there is excessively imperfect oxidation which, irrespective of the types of acid, underlies, as is now pretty generally recognized, severe constitutional stress allied to that of diabetic acidosis. In cases in which the degree of acidity falls below thirty similar states occur, as G. F Butler

(*American Medicine*, Vol. X) has pointed out, from insufficient elimination. The degree of acidity is obtained by taking 5 cc. of the urine specimen, plus two drops of phenolphtalien solution, as indicated, and then adding N/10 Na.O.H. until a slight pinkish color is produced. The number of cc. of N/10 Na.O.H. required, multiplied by 20, equals the degree of acidity. Another great source of acid lies in the resorption of the products of imperfect intestinal fermentation, like indol, which is eliminated as indican by the kidney under great strain. Wherever there is an endogenous or an exogenous poisoning, with which the liver is unable to cope and the strain is thrown on the kidney, elimination proceeds through the skin, nasal and buccal mucous membranes, and hence through the alveolar process, since the last contains end organs in which useless products settle. This produces, for example, the blue line of lead poisoning, the green of copper and red of mercury.

The tendency to graver disease as here presented is shown in the inflammation and absorption of the alveolar process. The physical condition, reaction, color, odor, mucin and the cells (since they are apt to be of local origin) are of little significance. Crystals are of limited value, since the longer the urine stands before examination the larger the number of crystals. The amount of uric acid crystals confirms my report of some years ago (Pyorrhea Alveolaris. *International Dental Journal*, April, 1896). In these experiments teeth with deposits upon them were extracted, teeth around which excessive absorption of the alveolar process had taken place. One hundred were sent to one laboratory and one hundred and fifteen to another. They were examined for uric acid crystals by the hydrochloric test, the dry distillation and the murexid test. By the murexid test, twelve of the two hundred and fifteen gave positive reaction, and by the microscopic ten, or about 5 per cent, showed crystals. The microscopic examination of urine in forty-six cases revealed two cases, or about 5 per cent. From the uric acid crystals' standpoint, the theory must be excluded.

Croftan says (*Clinical Urinology*, p. 246): "While hyaline casts do not necessarily indicate nephritis, i. e., advanced renal inflammation, they nevertheless indicate renal irritation and should be regarded with suspicion. Covered with blood or renal

elements their pathologic importance becomes great, since their appearance then indicates distinct renal inflammation.

Urine containing hyaline casts often contains albumin in solution. The amount of coagulable albumin in solution may be minimal and, though rarely, albumin in solution, detectable by ordinary clinical methods, may be absent. The absence, however, of albumin, does not exclude renal irritation or even certain forms of nephritis.

To the category of hyaline casts probably belong the cylindroids, long bands and cylinders. These, like the hyaline casts, must be considered coagulation products of albuminous material that the tubular epithelia exude in small quantities. The factors that cause this exudation are not always determinable. Cylindroids of distinctly tubular origin are pathologic in the same sense as hyaline casts. They are often found in urine otherwise apparently quite normal. Neither they nor hyaline casts can, therefore, be considered typical evidences of patho-anatomic renal lesions, but are common in heart disease, with congestion of the kidneys, in a variety of toxic and infectious states, in irritation of the tubuli by crystals in acidosis, and after epileptic fits."

Cylindruria, according to Simon (*Clinical Diagnosis,* p. 620), is not necessarily associated with definite pathologic alterations of the renal parenchyma. This statement should likewise be accepted as to the occurrence of purely hyaline casts and their presence in small numbers. A few renal epithelial cells may be found at the same time occurring either in the urine or adhering to the casts, but never presenting an atrophic or otherwise altered appearance in the absence of definite renal lesions. The presence of compound hyaline and coarsely granular casts, as well as of waxy and amyloid casts, on the other hand, may be regarded as indicating definite changes in structure, so that as far as diagnosis is concerned microscopic examination of the urine furnishes information of more value than the simple demonstration of albumin.

Hyaline casts are more frequently seen—reference is here had only to the purely hyaline or, at least, but faintly granular form—and are found in all conditions in which albuminuria occurs. When present in only small numbers, and particularly when occurring but temporarily in the urine, it may be assumed in the

absence of other symptoms pointing to renal disease, that there is a mild circulatory disturbance of the kidneys.

Granular casts, according to Croftan (Clinical Urinology, p. 248), "invariably indicate either inflammatory processes in the kidneys or advanced circulatory disturbances (Cyanotic induration). They are almost pathognomonic of nephritis, especially when coarse."

The significance of blood and epithelial cells imbedded on hyaline casts is the same as the significance of blood and epithelial casts; both are pathologic and indicate nephritis.

Fine granular and hyaline casts often occur from auto-toxic strains on congenitally insufficient kidney in arthritic and allied states.

The presence of albumin in these cases was exceptional, it being found in but four cases. This would show that in none of these cases had disease become very marked. When present it does not in itself indicate grave disorder, since albumin may be due to many conditions of the renal tract. It is of interest to us since disturbance of circulation may bring about albuminuria without inducing structural change in the kidneys. Purday says: "Circulatory disturbances, in order to induce albuminuria, must include the renal vessels. In nature they must consist of acceleration of the arterial current or slowing of the venous current, in either case resulting in increased blood pressure. Again, in some derangements of the nervous system which interfere with the vasomotor nerve regulation of the renal vessels, temporary albuminuria is not an uncommon result." Albuminuria is present in auto-toxic neurasthenia, epilepsy, paretic dementia, and the renal crises of locomotor ataxia.

The specific gravity ranges from 1.005 to 1.031. The normal specific gravity ranges from 1.015 to 1.025. The difference depends upon the amount of solids and fluids present, increasing as the solids increase, decreasing as the amount of fluids increase. Specific gravity is hence an index in a general way of metabolic change. The low degree of acidity would indicate that a certain amount of acid was circulating throughout the system.

Critical examination of these tables must convince a careful observer that in every examination two conditions are present.

First, autoinfection due to intestinal fermentations and faulty elimination as represented by the indican. Second, kidney overstrain and renal insufficiency due to hepatic insufficiency. When the liver fails to destroy the poisonous materials and the bowels to eliminate the toxins, overstrain of the kidneys causes the blood to become overcharged with toxins and acidity, the heart and arteries undergo degenerative changes, and cardiac hypertrophy and cardio-vascular diseases, with insufficient blood supply, result.

Just what the toxins or their chemical characters are, we are unable to determine at present. It would seem, however, that they are the unoxidized products of metabolism, such as poisonous ammonium salts, xanthin and hypo-xanthin, which, when normally excreted from the system, are in the form of non-toxic substances. Croftan (*American Journal of Medical Science,* 1900) injected these alloxuric bases in small doses in animals, producing changes in the heart, arteries and kidneys, characteristic of Bright's disease. How these toxins act upon the circulatory system is not yet fully determined. It would seem from experiments they act in different ways. Some upon the vasomotor nerves, others upon the heart muscle direct, and still others upon the peripheral arteries, especially those of end organs. It is known the heart and arteries become involved before the symptoms of Bright's disease are observed.

"The old idea, then, that in Bright's disease the kidneys are primarily involved, and that as a result of renal insufficiency certain excrementitious bodies are retained that produce the changes about the heart and arteries, the eye ground and the brain, is not tenable. This course of events sometimes occurs in toxic and infectious forms of acute and sub-acute nephritis, but such cases are not Bright's disease." That the heart and arteries in end organs are the first involved in autointoxication as a result of intestinal fermentation, hepatic and renal insufficiency and drug poisoning, has been fully demonstrated. The heart becomes enlarged and a high blood pressure is developed. Dilatation of the arteries occurs, especially in those of end organs, resulting in arterio-sclerosis, which is present in every case.

To ascertain the blood pressure in patients suffering with interstitial gingivitis I used Cook's modification of the Riva Rocci

Sphygonomanometer, this instrument being best adapted for my convenience and exceedingly simple. The armlet used was sold with the instrument and consists of a rubber bag 4½ by 40 cm. The patients ranged from twenty-seven to sixty-seven years of age. With this instrument the normal adult female arterial blood pressure is 115 to 125 mm.; adult male, 125 to 135 mm.

In twenty-six females there were three who ranged between 115 mm. Hg. and 125 mm. Hg. and therefore normal. Three ranged below 115 mm. Hg., and twenty from 133 mm. Hg. to 180 mm. Hg.

In twenty-four males there were eight who ranged between 125 mm. Hg. and 135 mm. Hg. and therefore normal. Three ranged below 125 mm. Hg., and thirteen from 133 mm. Hg. and 160 mm. Hg.

When we consider that thirteen of these patients were under forty-five years of age, the high blood pressure is remarkable.

I have been unable to demonstrate whether the interstitial gingivitis is accelerated directly because of the poisons circulating in the blood vessels, causing high blood pressure by their action upon the heart, or because of their action upon the vaso-motor nerve governing the heart or blood vessels, or both. The effect of the toxins and extra blood pressure is to set up irritation and inflammation of the outer surfaces of the Haversian canals, producing halisteresis in the vessels of Von Ebner, producing Volkmanns' perforating canal absorption and setting the osteoclasts at work, all producing absorption of the alveolar process.

The question rises, Which end organ is the most susceptible and first involved in autointoxication? When a man visits the physician for treatment one of the first questions asked is, "What is your occupation?" If the man replies that he is working in drugs, metals or mines, the physician examines his patient's gums to note if his system be saturated with poisons. If a physician be treating a patient for leus, the drug is administered until the "gums are touched," which is the only indication his patient is under the influence. One of the most marked symptoms of scurvy is the inflammatory condition of the gums and alveolar process, which are always taken into consideration in diagnosis.

Physicians agree the arteries in such end organs as the kidneys, brain and retina dilate under blood pressure. The arteries rami-

fying bone structure, dilate only imperfectly, if at all. Arteries entering transitory bone structures gradually undergo pathologic changes. After the individual has obtained his growth these arteries certainly are more susceptible to toxin, poison and blood pressure than those either in the kidney, brain or retina. I have demonstrated these pathologic changes in the alveolar process in my work upon "Interstitial Gingivitis or So-called Pyorrhea Alveolaris."

Some of the following are expected to develop: Headache, irritability, fatigue, muscle soreness, hypochondriasis, vertigo, neurasthenia, lethargy, stupor, insanity, cutaneous affections such as pruritis, acne and urticaria; later arterio-sclerosis, gout, rheumatism, Bright's disease, diabetes, uric acid diathesis, nervous disorders, asthma, anæmia, and many other diseases. Before most of these conditions are apparent, interstitial gingivitis will have become firmly established, with marked recession of the alveolar process and oftentimes loosening of the teeth.

Discussion on Papers by Drs. Rhein and Talbot. *Dr. M. I. Schamberg,* Philadelphia, said that although there are some advocates of entirely local causes of pyorrhea or interstitial gingivitis, he is convinced that men who make a careful study of this obstinate disease, which is so refractory to treatment, are of the opinion that there are underlying causes for pyorrhea which are distinctly of a constitutional nature. He agreed with Dr. Talbot as to the necessity for more frequent examinations of the blood and urine in these cases. During the past few years he has been examining the urine in all cases of pyorrhea that come to his attention, and it is remarkable to note the number of cases in which either diabetes, Bright's disease, or an excess of uric acid may be found.

Dr. M. H. Fletcher, Cincinnati, said that a large part of his professional time is devoted to the treatment of these cases. He agreed that this trouble is of local origin, with systematic complication of many varieties, and he considers it interesting to note that the trouble in these cases will disappear by local treatment. It is a well-known fact, he said, that the conjunctiva, or other mucous membranes of the body, are irritated in the dry stage of inflammation. Every tissue of the body is subject to irritation, with accompaniments of systemic trouble. Dr. Fletcher believes

in a local cause for many disorders. It is a fact, he said, that every disease has its nervous phase; many diseases are now known to be purely nervous which were formerly thought to be organic. Any condition which produces a continual irritation may produce systemic disorders of a severe nature, and he is convinced that the systemic disorders referred to are brought about by the local irritation, which is continuous. There is an effort to throw off this foreign body, and this continuous effort of nature to restore herself to normal results in the destruction of the tissue about the teeth, with the result that finally a pathologic or diseased habit is established; and in no instance can it be cited that this trouble does not disappear by removal of the teeth. Dr. Fletcher said that it had fallen to his lot to do considerable work in the antrum, and in hundreds of examinations of the mouth and skull he has failed to find the antrum as far forward as the cuspid, and in but twelve cases in a thousand antrums has he found that the roots of the teeth produced a tubercle in the floor of the antrum, as shown by Gray and other anatomists. He has found abscesses of the molar teeth discharging in the antrum where the roots come against the floor of the antrum; the roots are often uncovered, so far as bone is concerned, just as all practitioners know; on the outer surface of the alveolar process the bone is completely gone and the root covered with nothing but soft tissue. Now it is easy to understand that in gingivitis going up the root in a case in which there is no body covering to the root in the floor of the antrum, there will be extension into the antrum, with all the accompaniments. This disease is something to which Dr. Fletcher thinks stomatologists must give more attention. He has never seen a patient in whom there was not more or less calcareous deposit. He has seen a case of pyorrhea in a child of ten. In other ways the child was perfectly healthy; the disease evidently had been caused by calcareous deposit.

Dr. G. V. I. Brown, Milwaukee, said that it might be of interest to recall something of the progress of the science of this particular affection, as Dr. Talbot has brought it out. His earlier papers demonstrated, for the first time by actual microscopic study, that this disease was considerably in advance of what he

had been accustomed to recognize as diseased tissue of this character. His first series of slides showed that. He next took up the question of autointoxication, and showed by slides the relation of those conditions in this disease, and again of that kind of poison to mineral and other poisons, bringing it all down to the simple proposition of an absorption and taking into the system of poison which was disastrous to tissue, which affects, first of all, that portion supplied by the very small vessels and structures of a transitory nature, such as the alveolar process. Dr. Brown said that we have all heard and read for years of the uric acid diathesis, and its relation to this disease, and now we find that uric acid, while it is a factor and sometimes represents associated disease, it is only one of many disturbing elements of a somewhat similar character.

Dr. M. H. Fletcher, Cincinnati, said that this discussion has shown unquestionably the local features of this disease, and, according to his mind, the proposition is quite simple; with the system loaded with intoxication there is less resistance to any kind of an irritation. If, under these circumstances, there is local irritation in this region, there is as a result a condition which we recognize in the disease. It is a well-known fact, he said, that affections of the kidneys, or other organs, weaken their powers of function, especially that of elimination, laying all the tissues especially liable to disturbance from any kind of irritation. Now, if we supply the irritation about the teeth, we produce the disease. If we remove the irritation and the intoxication, to that extent we relieve the condition and the disease.

Dr. Vida A. Latham, Chicago, said that this exhibition of Dr. Rhein's proves almost conclusively that the stand taken by some of the members of the Section, that dentists are pure mechanics, is certainly out of order. Dr. Latham said that we cannot do without the scientific branches. Dr. Rhein's exhibition, she said, to-day has shown that the mechanical filling of those canals, their anatomic bearings, the relations of those tissues and the far-reaching effects mentioned by Dr. Talbot, have brought together both the scientific and the mechanical aspects, as perhaps has never before been done. Dr. Latham said that we have to deal with another set of tissues, the mucous glands, which form around and in the peridental membrane, and that there is a bear-

ing of the mucous glands in the peridental tissue which has to deal with the question; these glands are also affected by the end organs and by the arterial changes. What the exact histologic and anatomic conditions of those mucous glands are we do not know. Dr. Latham declared that it can truthfully be said that in some lines dentistry has advanced far ahead of medicine. But in these particular lines—the scientific and anatomic—we are not advancing as rapidly as in the mechanical.

PORCELAIN DENTAL ART.

BY CHARLES H. LAND, L.D.S., DETROIT, MICH. READ BEFORE THE SOUTHWESTERN MICHIGAN DENTAL SOCIETY, AT NILES, MICH., APRIL 10, 1906.

Failure in porcelain work is not due to a lack of opportunities, but rather to the fact that dentists are not being furnished with the proper material. As the porcelains are manufactured, we are not familiar with their composition, and therefore we cannot use them with the best results. Under the circumstances, I have been compelled to change and compound for myself in order to be more successful. When talking about porcelain work drop the term porcelain, because every man that happens to find a combination of silica with some other element calls it porcelain. When one looks into the history of porcelain he will find three hundred different varieties of vitreous masses under the nomination *porcelain*. If we go back of all we will find that silica is the foundation principle of both clays and glass, and that just in proportion as one adds the quantity of flux and reduces his compound to a lower vitrified mass, he gets more translucency. Anything translucent can be partially seen through. It is something that is not quite opaque. One can take any or all of the low-fusing samples that are made for the so-called porcelain inlays, and, because they are convenient to be used, does not change the hard fact that one cannot take samples from the specimen rings and match them with any of the porcelain teeth manufactured to-day. On account of this I take the molars from the various makes of pinless teeth and grind them up in different degrees of fineness, and, according to the different degrees of

grinding, get much better results, for I thus secure more translucency, stronger resistance and less shrinkage, and I can play with them in the furnace as long as I like without changing the color. If I could add color to silica and make it into teeth I could widen the art of making porcelain teeth. This I have al-

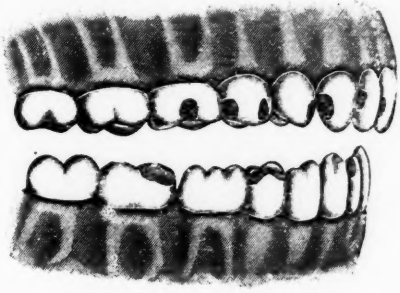

Fig 1

most accomplished, and in some instances I have made a post with pure silica and fused to it the various colored porcelains of the high-fusing bodies. With our present facilities a great many failures are due to want of better material.

I have a paper that was prepared for and accepted by the New York State Dental Society, but not used by them, so I shall present that paper to you.

Porcelain as an artistic means for restoration of defects in the dental organs is a well accepted theory. However, when it becomes a question of durability, or the conservation of what remains of the natural tooth structure, there seems to be a want of confidence. This is especially so with too large a percentage of men eminent in the profession. Yet we may say that this honest doubting is due principally to a lack of practical experience.

For the benefit of those who are interested in all things that aim for advancement in dental art, I will offer some historical facts and some original ideas.

It is now nineteen years since my first publication of the manner of forming the metal matrix for inlays, contours, all porcelain

crowns and the metallic-enamel cap, or jacket crown, and almost twenty years since they were reduced to practice. During this period my time has been devoted to the better development of the art and close attention to its practical application, and this with results sufficiently substantial to be able to produce numerous patients who have had each and every description of all classes of porcelain restorations in use from 16 to 19 years. This includes inlays, both gold and porcelain. Contours of porcelain, ¼, ½, ¾ and entire porcelain crowns, metallic-enamel caps and bridge work.

During this term of practice over two hundred practitioners have spent more or less time in my office and laboratory and enrolled as partial or entire students; all of them ambitious to succeed, but few of them following up the practice, even with reasonable success. It will also be interesting to realize that among those who are the most successful were the ones who remained as students at least six to eight months, and it is to their perseverance and constant effort that I am under obligations for substantial support in propagating the real principles that form the foundations of true success in this ideal system of dental practice.

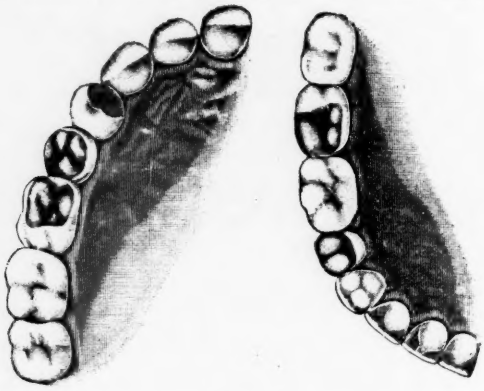

Fig. 2

From the start it will be significant to realize that the greatest attention has always centered in inlays, and this to such an extent as to overshadow the more important branches, such as contours, crowns, veneers, etc. At least two-thirds of the interest taken has

been devoted to what I have been forced to recognize as merely the letter "A" of the alphabet in this most fascinating method, yet, from careful observation, feel sure that while the porcelain inlays in their proper place are of remarkable and substantial value, nothing heretofore introduced into the field of dentistry has been so exaggerated as to utility, consequently with too many abandoned. In this way other and more valuable opportunities passed by unobserved. In order to reveal some of the latter see the illustrations Nos. 1 and 2, showing a series of fillings involving various forms of cavities in all classes of teeth as they would

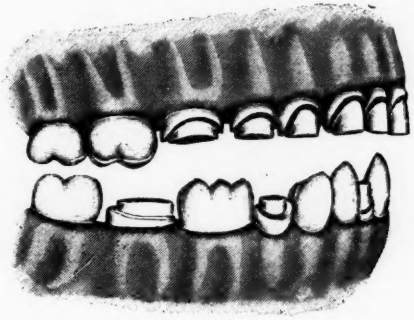

Fig. 3

appear when restored with gold. Nos. 3 and 4 as they would appear when prepared for the reception of porcelain restorations, and Fig. 5 as an approximation of the completed work.

The engravings Nos. 3 and 4 also represent the same varieties of teeth as they would appear in several stages of manipulation. The figures 1 and 2 in 7 B showing approximate lengths of the abutments, which, when prepared, are examples of the relative proportions wherein it might be possible to retain the pulps in their normal condition.

This being more or less variable, according to the age of the patient.

7 B—3, 4 and 5 show progressive stages; 3 is the platinum matrix, 4 porcelain shell or veneer, 5 indicates No. 4 cemented in place. By reference to the engravings Nos. 5, 3 and 4 one sees how either the right or left upper and lower incisors or any one of the twelve anterior teeth could be conveniently manipulated in

exactly the same manner; in fact, in any case where the entire 32 teeth were defective or denuded of their enamel this one simple device is remarkably efficient. So that in showing the method in detail a description of the one will be sufficient to all. See August *Cosmos,* pages 618 to 619, and the June issue, page 444. Therefore, by selecting either the lower lateral incisors, the upper cuspids, lower second bicuspid and the lower molars, as shown in the engravings Nos. 3 and 4, will be seen the approximate designs from which to form the platinum matrix as shown in

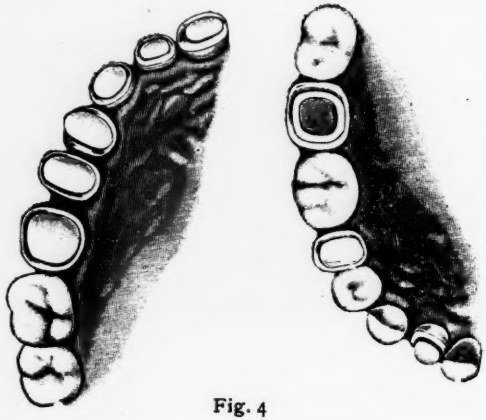

Fig. 4

No. 7 B, Fig. 3. This matrix is composed generally of 1-1,000 pure platinum foil and graduated in thickness from that down to ordinary plate, B. and S. gauge 28.

It may surprise those who have not been thoroughly familiar with all my methods of practice to see me quote platinum plate, B. and S. gauge 28, but what will be thought of it in some instances where experience has shown that platinum and iridium plate B. and S. gauge 26, in combination with the 1-1,000, is strongly advocated as the best, both for crowns, inlays, contours, etc., all of which, with proper tools and appliances, can be very rapidly and conveniently made to conform to or exactly correspond to the deepest cavity or outlines of a defective tooth. All can be made seamless without a puncture or flaw in them.

Again referring to the illustration No. 7 B (see Fig. 3), let

this represent platinum foil, the 1-1,000; a series of such are put on the market as articles of manufacture; they are graduated in various sizes, just as the usual seamless metal caps are produced; they are in reality approximate forms. Therefore, selecting one for a prepared root—as seen in Figs. 1 and 2 in 7 B—and in case it proves not exactly adapted the slight errors can be overcome in a rapid and convenient manner by first taking an impression of the stub end of the tooth and from this form a die of easy fusing metal. With this the approximate form can be perfected and finally made absolutely exact, no matter how thick, thin or stiff the metal plate might be.

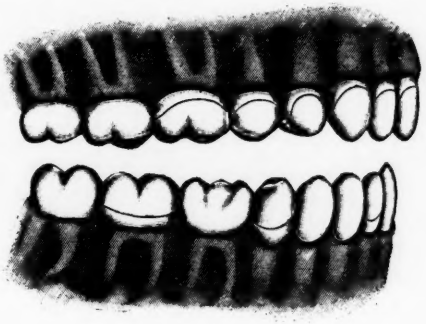

Fig. 5

This system of providing approximate forms both of inlays, contours, caps, crowns, when properly practiced, is a decided advantage and substantially the means of securing the most perfect work in adapting porcelain in operative dentistry.

Engraving No. 8 B, Fig. 2, is designed for the purpose of showing how to overcome subsequent decay or any imperfections in the joint between the vitrified veneer and the wall of the tooth. The darker outlines indicate a gold filling on the lingual surface, or it might in some instances be guttapercha or amalgam cemented; in fact, any suitable substance for the purpose of arresting partial decay.

In the engraving 7 B, Fig. 4, is represented a porcelain hood or veneer that at least covers seven-eighths of the entire crown of the tooth (see Fig. 5). Calling particular attention to both

modifications, this supports the argument that when three-fourths or seven-eighths of the entire surface of the crown is indestructible and hermetically sealed, then we have at least reduced the possibility of decay to the minimum, the thread-like joint being the only vulnerable point left exposed. In 8 B, Fig. 2, the dark and wider portions of the line theoretically indicate subsequent decay; this is located on the lingual surface of the tooth or it might in rare instances be entirely girdled at the cervical border and consequently make it necessary to adjust the rubber dam and carefully fill the joint, selecting either gold foil or guttapercha. In this instance, when completed, you may have the satisfaction of calling to your assistance seven-eighths of absolutely indestructible surface supported with a joint formed from materials

8 B

7 B

that have, during all the past experiences, proven to be the best as a tooth preserver, lacking only the truly esthetic, so that in the combinations as here described we can recognize the culminations of both, or the arrival at the highest pitch of perfection in the dental art. When defective incisors, cuspids, bicuspids and molars, as shown in the engravings Nos. 1 and 2, are treated as here described it will be important to observe that in every instance the outlines of all the joints are located above the cervical border sufficiently, at least, to adjust the rubber dam below them. Thus we have constantly in view the locality where subsequent decay might intervene, even on sound tooth structure.

It will also be important to note my methods of procedure in operating below the gum line, especially between the approximal walls of the adjoining teeth, and in such instances, when the cavity is very deep and it is not practical to adjust the rubber dam, an impression of the cavity is taken as for an inlay, either of gold or porcelain, and after the usual methods cemented to place. This forms a foundation or pier on which to rest the sec-

tion that is represented in the hood—see the illustration 7 B, Fig. 4. Also notice that in the molars in the engravings 3 and 4 and in the illustration 7 B special attention is required to see that the shoulder and joint are about midway between the cervical border and the grinding surface of the molars and bicuspids. In the incisors the joint can be made just below the festoon of the gum labially, but approximately higher between the adjacent teeth and still nearer the cutting edge of the lingual side—see the engraving No. 8 B, Fig. 2.

The various modifications here shown are presented merely as a criterion or guide for the restoration of teeth that can be readily manipulated, with the idea of preserving the pulps. Such are especially advocated for young people whose teeth may be only partly developed, irregular, malformed, badly discolored and extensively decayed, and, most important, for persons who are sufficiently imbued with the value of such high ideals to willingly pay a good compensation for the extra care, skill, time and expense involved in order to arrive at that goal which represents the most perfect, practical and artistic result, possible only to the most skilful operations. It is a class of work that is absolutely so foreign to commercialism in every sense of the word as to defy cheapness, and therefore it must be recognized at once, but not as the ideal filling material that the profession has so long sought, in the form of a plastic cement having all of the above attributes at the same time, setting and hardening in the mouth, needing no firing or platinum or gold matrices, etc., but a means for which we can only be thankful, a means that offers the incentive to do, even at great expense and labor, all the good that may be found in possibilities, and in this way reap the highest honor and secure the largest compensation.

The process here described also embodies a very strong plea in favor of the theory of

EXTENSION FOR PREVENTION.

In no other class of work could this proposition have so strong an argument from the one fact alone that natural appearance is renewed. Again referring to the engravings Nos. 3 and 4 and 7 B, two views are shown. Notice that the cuspids and incisors, so far as the engraving in No. 5 is concerned, do not represent the joint or shoulder as being below the festoon of the gum,

although in practice with the incisors it is always accomplished. Observe that the second lower molar is well separated from the first and third. Carry the comparison from this to the engraving, Fig. 4. Here they are recontoured to come in full contact with the approximating surfaces of the adjacent teeth. The aim is to have the contact exact and in this way prevent food from readily passing between.

This is a recognition of nature's intentions to provide protection from the accumulation or lodgment in the interproximate spaces of foreign bodies that would be very difficult of removal and would be liable to ferment and rapidly establish decay. It will be readily seen from the natural form of such spaces, extremely narrow at the point of contact, and the reverse close to the gum margins, that it would be comparatively easy to keep them in a sanitary condition. This method of procedure as compared with the metal cap system, practically and from a sanitary standpoint, when carefully observed, will in the near future become an important revelation to those who to-day will seriously doubt the contention.

Referring specifically to the circumscribed ledge or joint that environs the cervical border, the great value and safety of a well-made contact of this kind has become so well established in all our porcelain crowning methods that, while I show well-designed methods of prevention in the engraving No. 8 B, I can say it was seldom found necessary, the cement joint alone being practically efficient.

HIGH AND LOW FUSING BODIES.

Recently this subject has been discussed by some members of the profession, and much confusion has been developed, but no satisfactory conclusions reached. In offering my assistance on the subject I will suggest that both bodies and enamels that are appropriate for dental uses have a practical fusing point that ranges from about 1,900 degrees F. to 3,400 degrees F., and that within this compass from twelve to fourteen varieties may be of some substantial value, and that in proportion as our facilities will enable us to ascend in the temperature of fusing point the ideals of perfection are the nearest accomplished, and in proportion with greater ratio, as we descend toward the lower fusing mass we narrow the field of its utility. The reasons become quite

obvious when we consider the wide differences in the properties that are chemically developed by the uses of the various fluxes necessary in order to raise or lower the fusing point. Each material is distinguished by individual properties that are more or less desirable according to the purpose or uses designed.

In dentistry we seek for the qualities that demonstrate the inherent power of maintaining the most perfect form or contour both before and after fusion, and yet will show a perfect glaze. Also porcelain bodies must retain their color after repeated reheatings, and show the least tendency to shrink. All low-fusing bodies seriously lack such properties, therefore their uses in porcelain dental art will be very much abbreviated. If the broad claim that some manufacturers and dentists are making were true—theorizing that a low-fusing vitreous mass is equal to the high-fusing, alike in strength, color and power of contour—then we ought naturally to be amazed at the foolishness of our leading tooth manufacturers, who have for years, as their criterion of excellence for their wares, held to the highest possible point of fusion, and we would be inclined to suggest to them that their teeth had better be made of glass.

A PLEA FOR THE MORE EXTENSIVE USE OF NONCOHESIVE GOLD.

BY DR. L. G. NOEL, NASHVILLE, TENN. READ BEFORE THE KENTUCKY STATE DENTAL ASSOCIATION, AT LOUISVILLE, KY., JUNE 11, 1906.

Were it possible, in the scope of a short paper, for an essayist to cover the whole field of cavity preparation and methods of technique, it would be unprofitable to do so, save for the purpose of showing the improvements that might have been made in the light of past experience.

If I can briefly point out to you some of the errors that are being committed by skillful operators, errors resulting more from faulty teaching and want of observation than lack of manipulative ability; if I can induce you to put together the good old ideas and the good new ideas, thus causing you to see the mistakes that are being made, I shall be content.

Recently the assertion has several times been made in print, and by high authorities, that the art of filling teeth with gold has reached perfection. Who is the man who is doing this perfect work? By what standard is his work judged? We doubt if it is possible for the hand and brain of man to reach perfection in anything. Therefore, it behooves us to strive to improve, to reach out after higher achievements.

Those of us who attended the clinics of the N. D. A. at Buffalo last summer and saw the fine work done there by that enthusiastic coterie of skillful operators from the Northwest, who call themselves the "G. V. Black Club," probably came back impressed with the idea that these men are renewing some of the good old methods and are endeavoring to graft them on to new stocks. If you saw those clinics you were probably carried back to the days when such men as W. H. Atkinson, Corydon Palmer and Marshall H. Webb labored so hard to teach their methods and succeeded in arousing so many, stimulating them to greater effort, and working great improvements in dental practice.

At the Buffalo clinics I was especially impressed by the return to the use of the hand mallet, as evidenced by nearly all those operators, and by the combination of unannealed gold and the annealed or strictly cohesive foil, in the large operations that they were making. No one actively engaged in this field of dental practice can come in contact with these men and fail to catch the fire of their enthusiasm.

In the February number of the *Dental Cosmos* (1906) I had the pleasure of reading Dr. Conzett's paper, which I had failed to hear at Buffalo, and in the April *Cosmos* (1906) I have been reading the discussions which followed the paper in the section. This has led me to go back over a great deal of the literature on this subject from 1890 to the present day. In this review I had the benefit of the writings of Dr. Black, Dr. Perry, Dr. Johnson, Dr. Jack and others of great ability in this field. My review also embraced the criticism of Dr. Ottolengui of the paper by Dr. Black in the *Dental Cosmos* for 1891, in which paper Dr. Black sets forth the doctrine of the extension of cavity margins for prevention. My review also embraced that valuable series of papers which the able and enterprising editor of the *Items of Interest* elicited from Dr. Black and his followers and critics, all

of which the editor has brought together in the twenty-third volume of his journal—a collection which I consider one of the most valuable contributions to the literature of operative dentistry. No one, after reading the above-mentioned series of papers, and noting the difference of opinion on the subject of cavity preparation, could think that we are yet near the point of perfection in the art of filling teeth with gold.

It is fortunate that we have the faculty of selecting for ourselves such morsels from the teachings of our leaders as are suited to our own powers of assimilation and use. I read, when it first appeared, that paper of Dr. Black's on the "Management of Enamel Margins" (published in the *Cosmos* of 1891), and while deeply impressed with its scientific truths, I think that I chose from the doctrine set before me just about as much as was good for me in my practice. I need not say that I realize my limitations, and I know that in dental practice we must first consider what is the most scientific, what accords best with the pathological conditions of the case, and the physical exigencies to be met by our finished work; then see how much of this we can do and how much is expedient. We shall, in each instance, select that particular method, or combination of methods, best suited for the case in hand. If the above statement is true, and I think that no one will dispute it, the successful dentist must be a man of sound judgment, ready with expedients and quick of invention, rather than a man who has wrought out a pet theory of what he conceives to be high science, ready to be applied to every case.

Early, then, after the enunciation of this doctrine of "Extension for Prevention," I resolved to use it in my practice with a *conservative caution,* believing this would be better for me and better for my patients. Fifteen years of practice, and a careful consideration of the whole subject, finds me of the same opinion with one great and deep-rooted conviction besides, and that is that *we are none of us using enough true non-cohesive gold.*

Dr. Conzett, in his paper on gold as a filling material (prepared for and read before the National Dental Association at Buffalo last July), speaks of his method of starting large approximate fillings in molars and bicuspids in language as follows: "The operators of the old days knew nothing about cohesive gold, and yet they made some very lasting and beautiful fillings. With the

advent of cohesive foil, however, the profession, in its delight with the new, forgot the good qualities of the old, and the use of non-cohesive foil passed into desuetude. We are beginning to appreciate the fact that this was a mistake, and at the present time we are combining the two, using the good qualities of both and eliminating, as much as possible, their bad qualities.

"The non-cohesive or *unannealed foil* is prepared by cutting a sheet into halves and quarters; these are then folded into ribbons of varying widths, and these are in turn rolled into cylinders upon a Swiss broach, a hat pin or some other suitable instrument. In using them, for instance, in a cavity in the mesio-occlusal surface of a molar, a quarter cylinder is placed in the linguo-gingival angle, and one in the bucco-gingival angle, and these are keyed to position by placing one or more half sheet cylinders between them on the gingival seat and then strongly condensing them with hand pressure, which may be followed by mallet force if desired. After this we commence with our cohesive foil, anchoring it in the step in the occlusal surface and building the gold forward over the *unannealed foil* in the gingival third of the cavity, effectually locking it into place."

You will note, in the above quotation, that I have marked with italics the place where the writer confuses the term unannealed foil and non-cohesive gold, thus admitting the use of a cohesive gold unannealed, instead of true non-cohesive foil. This method I saw carried out at the Buffalo clinics by several members of the G. V. Black Club. If any members of that club used a strictly non-cohesive gold in any part of his work, it escaped my observation.

In the discussion following the reading of Dr. Conzett's paper Dr. Edwin T. Darby is reported to have referred to this fact with the following remarks: "Many of us know that just as lasting operations have been made with non-cohesive gold in simple cavities as have been made with cohesive gold. At the same time I think that it would be a mistake for a man to confine himself to either. The procedure in the process Dr. Conzett has given us is doubtless one of the most efficient that has ever been used, namely, a combination of cohesive and non-cohesive gold. Many do not understand what is meant by non-cohesive or soft gold. I take it that Dr. Conzett does not mean gold that is absolutely non-

cohesive, as I believe that there are but two manufacturers in this country who have ever made absolutely non-cohesive gold—Abbey & Morgan, Hastings & Co. It is not that kind of gold that the men of the Northwest use. They use a gold that possesses only a moderate degree of cohesion. In other words, it is a gold that is slightly cohesive under pressure, yet sufficiently non-cohesive to admit of perfect adaptation to the walls of the cavity. They use it in the form of ropes, tapes or cylinders, and make a better adaptation with it than with cohesive foil used in the same way. To expedite the operation they use non-cohesive gold at the cervix. I do say that a man can use cohesive gold successfully if he take the time and use it bit by bit; but he can use non-cohesive gold at the gingival and the result will be as beautiful. I know of no other method by which I can save time and get more satisfactory results."

It was indeed a pitiful mistake to abandon the use of non-cohesive gold, and now in our efforts to correct it many of us find it hard to get back to the right path. We cannot substitute unannealed cohesive foil for the old, true non-cohesive gold and make operations as lasting as those made by the old non-cohesive operators, such men as Harris, Maynard, Badger, Morgan, Redmond, Clark and others. It is a pity that the G. V. Black Club, that brilliant coterie, cannot get back into the middle of the non-cohesive road, for it is *very, very difficult* to make a perfect adaptation of semi-cohesive or unannealed gold when rolled into cylinders, as Dr. Conzett describes. I do not say that it cannot be done, but I do not trust the method. I doubt my ability to do it. If a true non-cohesive gold, such as Charles Abbey's foil, were used in the manner he describes I could put my faith and trust in the work, for it does not harden under stress, does not cohere, but slides upon itself, spreading laterally so that the cylinders tighten each other. It is so soft and adaptable that no one need fail to adjust it to the walls of the cavity, and when thoroughly condensed it is more solid because more of it can be packed into a given space than any other form of gold.

I wish to make the assertion that a mass of true, non-cohesive gold conducts heat and electricity less readily than a mass of equal density, composed of cohesive gold. This, I know, is difficult to prove because both are conductive, but clinical observation

bears out the assertion, and it seems to me that it must necessarily be true, if the non-cohesive property is due to the presence of foreign matter upon the surface of the foil. This must act as an insulator breaking and hindering the passage of the current. I am aware that the statement that non-cohesive gold has a foreign substance upon its surface is prejudicial in the minds of many. I have noticed this especially with dental students when told by the advocate of cohesive foil that this form of gold is perfectly clean—that only absolutely pure and clean gold can maintain its cohesive property, that all non-cohesive gold has some extraneous matter upon its surface. The mind of the student is biased from this moment in favor of cohesive foil, of which he sees nine times as much worked as of the other form of gold.

Comparatively few of our dental schools give any instruction in non-cohesive gold. Another prejudicial statement that we are compelled in candor to make, is that we are ignorant of what gas or gases, substance or substances, non-cohesive gold carries upon its surface. In rebuttal of all this we have only to turn to the chemist, the refiner of gold, and we have his statement that the old Charles Abbey's non-cohesive gold has no base metal upon its surface, no deleterious substance, and that it will assay nine hundred and ninety-nine fine, the same as the best quality of cohesive foil. In Dr. Conzett's paper, above referred to, we note that he attributes its want of cohesion to the presence of carbon dioxide upon its surfaces, but if we cannot know this, we *do* know that the most lasting and durable fillings of gold known to the dental profession have been made of this form of foil. We *do* know that by the presence of this unknown substance a valuable therapeutic quality is imparted to this foil. Cohesive foil may be said to have injurious qualities due to its high conductivity, but beyond filling a breach, restoring shape and contour, it is utterly devoid of therapeutic qualities. The young student may take fright when the cry of "foreign substance" is raised, but we know that more than one hundred years of satisfactory service attest to the superiority of old, true non-cohesive gold.

The old operators who worked Abbey's foil by hand pressure only were aware of the fact that a filling could be made water-

proof, calculated to arrest decay and yet not reach the limit of dentistry easily attained with this foil. This was notably true in the approximate surfaces of incisors and cuspids, where such fillings are subject to little stress. A favorite method with these men of testing the quality of fillings was to try their density with a small, wedge-like plugger, and if the filling was easily punctured the work was viewed with suspicion, no matter how well it might appear. Such work on grinding surfaces doubtless owes its efficiency to the further condensation of the gold by the stress of mastication. I do not advocate a return to such defective methods of condensation further than to urge the employment of hand pressure for the placing of gold and for its condensation also to a limited extent, especially where the direction of the force thus attained must be from behind forward, for in such cases it becomes invaluable.

The introduction of the rubber dam, mechanical separators and the mallet are indispensable aids that no *modern* non-cohesive operator will scorn, and with these helps he will be ready, when occasion requires, to avail himself of the valuable properties of cohesive foil, combining the two when it becomes necessary to restore contours, or to impart the necessary hardness to cutting and grinding surfaces.

In all large cavities on occlusal surfaces the method of using non-cohesive cylinders, as described by Dr. Conzett, in the paper already referred to (always employing *true non-cohesive gold*), will be found most valuable for several reasons, namely, to save time, to gain more perfect adaptation, and to lessen conductivity, thereby reducing the danger of pulp irritation.

Non-cohesive foil is especially adapted for the filling of simple approximate cavities in the incisors and cuspids, and the principles of cavity preparation taught by the old non-cohesive operators for this class of cavities were in the main correct.

In looking back over my practice and summing up the results of the experiments I have tried in my efforts to improve these operations; I note that whenever I have departed from the principles taught by these old operators I have regretted the change. I have also taken some notice of the experiments of others and their results to the effect that I have engrafted upon the old

stock principles of our fathers some modern ideas and methods that give me great satisfaction.

By using non-cohesive gold in these operations the operator is easily enabled to hide away his reparative art by filling always from the lingual surface (as taught by our fathers), thus avoiding one of the most common errors of modern cohesive operators, that of cutting away the labial plate of enamel to gain access. This should never be done, and gold should only be exhibited upon the labial surface when caries has already destroyed this precious portion of the enamel. Our forefathers urged the beveling back of the lingual plate of the enamel in filling these anterior teeth for good and potent reasons; first, to gain access; second, to leave open, and, as they called them, self-cleansing spaces; third, because the lingual plate of enamel is thin and friable, and as it must sustain much of the stress of biting is liable to crumble away, leaving defects and leaks after the filling is completed.

Very many of the young operators who are being turned out to-day from our dental schools as expert cohesive operators have been taught to wedge apart the front teeth, cut away the labial plates of the enamel to open up the cavities, and fill with cohesive gold, driving in the first portions of the gold against this thin, friable, lingual plate of enamel, a feat that can seldom be accomplished without splitting off some minute portions of the enamel, leaving a defective margin. These operations are then finished with cohesive gold and highly polished, making very showy but very ugly fillings that soon fail from secondary decay. Only recently I saw a young lady of seventeen or eighteen from one of our boarding schools with six of these blackened and defective fillings in the front teeth. The gold had become so black that it resembled amalgam. Language fails me in my efforts to express my disapproval of this method of operating upon the front teeth of young patients. It is my growing conviction that most of the above-mentioned cases should be treated with guttapercha or cement until the period of life when the most riotous decay has ceased; then when we feel that we may venture to fill with gold, such cavities should be filled with *true* non-cohesive foil, which is more compatible with delicate tooth structure than any other form of gold.

Digests.

GOLD INLAYS FOR BRIDGE ANCHORAGES; ALSO HOOD ABUTMENTS. By Thomas P. Hinman, D.D.S., Atlanta, Ga. The purpose of this paper will be to elucidate several unique plans for bridge attachment.

The calm that followed the hurricane that swept the country when the universal application of the porcelain inlay was advocated by some enthusiasts, has given us time to gather our scattered wits and to contemplate some of the inevitable wrecks that have followed in its wake. And from the after-thoughts has come the more extensive application of the gold inlay, and I, with many others, have applied it as an anchorage for bridge work, finding it both esthetic and secure.

In presenting this subject for your consideration, I deem it advisable to review some of the methods used for securing anchorage in bridge work, and also to show this rather modern method of bridge attachment. For illustrative purposes I will use one of the most common conditions found in the mouth requiring restoration with bridge work, i. e., the loss of the upper first and second bicuspids, the cuspid and first molar being intact.

One of the most common practices for the replacement of these teeth has been the placing of a gold crown on the first molar, and then either to devitalize the pulp in the cuspid in order to subsequently place upon it a Richmond crown, or possibly, instead of devitalizing the pulp, to simply adapt the usual open-face crown by devitalizing the pulp in the cuspid and anchoring a pin in the pulp-chamber, after burnishing or swaging a hood which is transfixed by the pin and soldered to it. While these methods have their several advantages, it is the purpose of this paper to introduce for your consideration a method that does not necessitate either the crowning of the first molar or the devitalizing of the pulp of the cuspid which obviates the display of gold resulting from the use of the Richmond or open-face crowns, and affords a secure and permanent attachment for the bridge.

The method here described is not given in the experimental stage, but has been used by the writer for several years. The hood has features that are original so far as I have been able to

find. It possesses over the Alexander or Carmichael attachments —more commonly known as the staple hood—such advantages as ease of construction, greater strength and mechanical correctness. This hood I will call a three-pin, double-step hood. The method of construction is as follows (see Fig. 1):

First, examine the occlusion to ascertain whether there is enough space for the accommodation—on the lingual surface of the cuspid—of the thickness of gold necessary in order that the finished hood shall have the required strength. If there be not sufficient space available, grind away the enamel on the lingual surface of the cuspid. With a No. 2 stump corundum wheel cut a step one-sixteenth of an inch above the gum line on the lingual side, running mesio-distally, and of sufficient breadth to accommodate a hole made with a No. 3 round bur. In order to avoid weakening and subsequently fracturing the enamel, the hole should not be made too near the latter. With the same wheel cut a broader step just below a line drawn mesio-distally between the angles of the cusp sufficiently deep to accommodate two holes to be drilled with a No. 3 round bur. These holes straddle the pulp, and should be cut to the depth of one-sixteenth to three thirty-seconds of an inch.

Prepare a piece of annealed inlay gold 0.003 inch thick, wide enough to cover all of the lingual surfaces of the tooth and to lap the distal surface, the idea of having the gold lap distally being to secure attachment for the solder used in uniting the bridge. Mallet and burnish this gold into steps and to the lingual surface of the tooth. The plugger point for this purpose is made of a piece of orange wood and is used in connection with an automatic mallet. The point of the plugger is cut wedge-shape and the tread squarely. Remove the gold and trim approximately, allowing for a wide lap on the distal side. Return the gold to the tooth, and puncture holes through it to correspond with the openings previously drilled into the steps. From No. 20-gauge iridio-platinum wire make pins suitable for these holes, and allow them to project far enough through the gold so that they may become engaged in the modeling composition used to remove the gold and pins. With the gold pins in position, take dry-heated modeling composition, and force it over the lingual side

of the tooth, thus engaging both the pins and the gold; then chill the compound and remove it (Fig. 2). Run a model in sump and remove the modeling composition, care being taken that in so doing the pins are not withdrawn from the model (Fig. 3).

If the pins should come away with the compound, they may be replaced on the model if care is used. Heat up the model carefully, and with very small pieces of 22-k. solder attach the pins to the gold, always being careful not to use an excess of solder, which if done would cause the thin gold to become too stiff. When cool remove the investment, return the piece to the mouth, and carefully reburnish it. Be sure to allow a good lap of the gold on the distal surface. Remove it from the mouth and with or without investment thicken this hood with 20-k. solder.

FIG. 1

being careful that no solder runs over the margins and reaches the side that comes in contact with the tooth. Replace the hood in the mouth and grind it to a proper occlusion (Fig. 4). In cases of very close-bite occlusion it is sometimes advisable to grind the lower cuspid slightly in order to gain additional space for the thickness of the hood which is thus rendered sufficiently strong and resistant.

MOLAR ANCHORAGE.

Prepare a large approximo-occlusal cavity with a flat basal wall on the mesial surface of the first molar. Broaden out the cavity on the occlusal surface so as to secure a good dovetail. The bucco- and linguo-mesial walls should be flared well to the angles. These walls are chiseled away so that they will flare slightly toward the occlusal surface. The neck of the occlusal anchorage is made large enough to admit a No. 9 bur, in order that the inlay may not be weakened at that point. A gold inlay is now constructed by any method the operator may choose, to fit this cavity, although your essayist excludes hollow inlays in these

cases. The inlay should be polished to a margin on the mesial side and ground to accurate occlusion.

Having the hood and gold inlay in position, take a wax bite and plaster impression in some good investment compound—sump preferred. Set the pieces in an articulator, grind and back the facings, articulate them with the cusps waxed in position, remove the facings and cusps en masse from the model, invest them, and fill with 22-k. solder. These dummies should then be trimmed with the file, partially polished, and returned to the model and again waxed to position. Trim the model and invest as usual. After the wax has been boiled out, carefully fit two gold wedges of 22-k. gold plate at each end of the dummies—between them and the anchorages—flux and unite with 18-k. solder.

The object of the gold wedges is to prevent the solder from pulling the abutments, thus causing a misfit, as an accurate fit is here absolutely imperative. The dummies are then polished, and the hood and inlay are polished and finished after the bridge has been set. In this manner we are able to replace the bicuspids without any display of gold. In this same manner the first bicuspid may be replaced, using the second bicuspid as a distal anchorage. I have had cases of this description in the mouth for several years, the hood and inlay having proved a satisfactory and secure anchorage.

Fig. 5 shows the finished bridge.

Fig. 6 shows the finished bridge in position.

I have some bridges doing good service, extending from the second molar to the cuspid, the distal anchorage being a gold crown, and the mesial anchorage the hood here described. This hood may be applied to any of the anterior teeth, the result being as satisfactory when used on an incisor as when adapted on a cuspid, and has been successfully employed on both laterals to support the missing centrals. In one case I have replaced the centrals and laterals, using hoods on the cuspids. This bridge has been in position over a year, and has proved secure thus far. Of course in cases in which two hoods are used great care must be taken to drill the holes parallel. However, the difference between the diameter of a No. 3 bur and No. 20 iridio-platinum wire is sufficient to allow of some slight deviation in the alignment of the holes.

HOODS FOR BICUSPIDS.

In cases in which the second bicuspid and the first molar have been lost and it is desired to replace them with a bridge, a convenient hood may be constructed somewhat after the Alexander method, but in my method I use no staple. Grind away the lingual cusp of the bicuspid (Fig. 7) sufficiently to allow for its replacement with gold. Cut cavities on the distal and mesial surfaces of the teeth of sufficient depth to have their gingival margins under the gum line. These cavities should be cut with a square-end fissure bur, and should form an arc of a circle bucco-lingually of sufficient breadth to reach as far as the buccal and lingual angles in both cavities. The lingual enamel is now trimmed away in order to secure slight bevel from the gum line

FIG. 2

FIG. 3.

FIG. 4.

to where the cusp has been ground off—this bevel leaning buccally. The matrix is made of inlay gold after the usual method, and is carried well over the gingival margin of the cavities as well as under the gum margin of the lingual side. The making of this compound matrix may be facilitated by laying the annealed inlay gold on a piece of blotting paper, and by pressing and rotating upon the center of the gold the round end of a large cone-socket handle. If this be done for a few minutes, the gold will curl up on the sides, forming a cup-shaped piece. This piece should be annealed again before it is placed in the cavity. It should then be burnished and malletted in the cavity to close adaptation by means of an orange wood plugger as previously described. It is well to protect the gold with a pledget of cotton in order to prevent tears in the matrix.

The matrix is now removed, thickened with 22-k. solder (Fig. 8), returned to the cavity and the margins reburnished. Remove it once more in a modeling compound impression and bite, place it in an articulator, and adapt to it a form swaged of No. 36-

gauge pure gold to restore the lingual cusp. The latter is waxed in position and the lost parts are restored in wax (Fig. 9). Cut the tooth from the model, and invest it with the buccal side downward, heaping up the investment so as to protect the cusp and to just cover the lappings of the matrix (Fig. 10). Boil out the wax, and fill with 22 or 20-k. solder. If when the hood is returned to the mouth there is not sufficient solder to make a knuckle on the mesial side, more solder may be added by sweating. This may be done without re-investing the piece. The hood when finished will withstand the necessary stress of mastication, and will support a bridge of ordinary dimensions. This hood has all the advantages of a gold crown without the disadvantage resulting from the display of gold.

Fig. 11 shows the hood in position.

Replacing a lateral incisor in cases in which there are large cavities on the mesial and distal surfaces of the central incisor. This may be done (Fig. 12) by uniting the two cavities on the lingual side, leaving the labial enamel intact, or cutting it off when weak. Make a mesio-inciso-distal gold inlay and solder the facing to it (Fig. 13). I have several cases in my practice in which I have followed this method, one of which has been in position for several years. Fig. 14 represents the bridge in position.

Replacing the first bicuspid, using no cusp or dummy, in cases in which the second bicuspid is decayed (Fig. 15). This may be done by making a mesio-occluso-distal cavity in the second bicuspid, constructing a gold inlay for it, and attaching to the latter a facing with solder (Fig. 16). The neck that unites the two cavities must be sufficient to withstand the impact of mastication.

Fig. 17 shows the bridge in position.

In cases in which gold inlays are used for anchorages, the surface to which the facing is soldered should be polished to a margin before the impression is taken, as otherwise it would be impossible to polish it properly after the piece is completed. In the use of gold inlays for anchorages in bridge work I have never found it necessary to use pins in them, although they may be employed if the operator should so desire.

In conclusion let me say that I believe the gold inlay is in its

infancy and that the time will come when the more lengthy and tedious operations of filling large cavities with cohesive gold and the mallet will be a thing of the past; for just as artistic and permanent results can be obtained with the gold inlay with less strain on both operator and patient.

DISCUSSION.

Dr. Ottolengui. I want to say publicly that I made but one gold inlay before I saw Dr. Hinman's work last May, and I removed that one recently, putting a new one in its stead. For us old fellows the gold inlay has just about arrived in time. I will give you a case from practice. I had a patient come in with a disto-incisal cavity in a cuspid, without any natural separation,

FIG 5

FIG 6

and she objected to having one made. She would not wear a wedge, nor would she consent to the use of separators. The cavity was practically a lingual cavity, that is, one in which any filling material inserted would not show from the labial. I took out a gutta-percha filling that I had put in to tide the tooth over; but, gentlemen, when you tide anything over, the day at last arrives when you must do the work right, and probably with more trouble than you would have had in the first place. To put a gold filling in that tooth without any separation would have been a difficult problem. I put in a gold inlay according to Dr. Hinman's teaching in forty-five minutes, and dismissed the patient. The bulk of the work was done in the laboratory and not on the patient, and I can truthfully say that it is difficult to detect that it is an inlay. It looks exactly like a gold filling.

I must admit I have been skeptical about this hood attachment. I have been very skeptical about the Carmichael work and also

Dr. Alexander's, but Dr. Hinman's work seems to me to be better. His hood over the bicuspid appeals to me very strongly; so much so that I arranged with a patient this afternoon to do one next week.

The point of importance is this: There is a revolution in dentistry at hand. We who have been making gold fillings for so many years have looked askance at all sorts of inlays on account of the cement, and it has been said a hundred times at dental meetings that if we could only obtain a perfect cement, we would have a grand way of filling teeth. We seem to have a perfect cement, because curiously enough, however they may look to the eye, that joint is closer which is made with cement than any other that is made—yea, by the best of our practitioners—with gold foil. I have not only seen the models passed around, but other cases, for Dr. Hinman makes it a rule that all his patients who go to New York shall call to see me, and I can say all the cases are beautiful.

When we insert a gold filling, which of us is absolutely certain of contact at every possible portion of a cavity wall? By using a plastic and forcing a properly made and well-fitting inlay into it we have as near contact throughout that cavity as a human being can obtain, and I believe it is that absolute cohesive contact that makes the inlay superior to an ordinary filling.

Dr. Shields. I have had some experience with these inlays, and thus I was able to follow the paper readily. The idea of mutilating a molar in making these separate steps is to my mind absolutely out of order. The age of the patient is not given. If you follow this procedure in young patients, injury to the pulp would result. If the patient is sufficiently old and there is much recession, you could do it more freely. The principle of a gold inlay is absolutely right if constructed on accurate lines. This mechanism, involving such extensive cutting, I have never employed in constructing a posterior abutment for a bridge, because in my hands it has not been necessary. You can take the very case Dr. Hinman so beautifully described, a case having a mesio-occluso-distal cavity. You can utilize such cavities in the construction of a gold inlay in a beautiful way. If the patient is young, it is improbable that the teeth will be loose. If the teeth are loose the treatment is different from what it should be when

they are tight. If the teeth are loose you must first make them absolutely rigid, in which case the pulps should be removed and anchorage secured in the pulp chambers or in the root canals.

This paper deals with tight teeth, and in such cases I would simply take advantage of the cavities on the grinding surface and on the mesio-approximal surface and make a gold inlay, using a piece of iridio-platinum pin metal for the interior portions. The post extending into the occlusal cavity is bent at right angles with the horizontal portion, which should be allowed to extend through the approximal cavity into the dummy. If there be no approximal cavity, make one just a little larger than the pin metal used, and when soldered to the pure gold—that fits the cavity perfectly—you have the strongest possible abutment, and,

FIG. 7. FIG. 8 FIG. 9.

an inlay without any mutilation excepting on the occluso-mesial angle, with simply the appearance of a gold filling.

I do not think this idea has ever been presented to the public, although it has been my pleasure to explain it often to individual dentists. When you set a bridge in that way there is no danger of it ever breaking at the point of junction of the inlay and dummy, and also avoids excessive mutilation to gain strength and a broad surface of gold to solder the dummy. The avoidance of cutting is always a serious consideration, because the patient is spared much unnecessary pain and subsequent inflammation of the pulp.

Take, for instance, the attachment to this central shown here to-night, which is beautifully made. Is that a fair example of conservative dentistry?

Dr. Hinman. That specimen was not presented at all. It was not even described in the paper. It was done by my assistant and thrown out. (It consisted of a pure gold foundation made to fit the palatal surface, with pins set through and soldered—to fit two small holes drilled into that portion of the tooth.)

Dr. Shields. That is the disadvantage of not having previously read the paper. I got more from the model than from the paper.

In regard to the attachment of anterior teeth, if the tooth for the anterior abutment be loose, have no hesitation in removing the pulp and anchoring the pivot into the root canal. Bend the pivot at the lingual surface, allow it to project, and solder it to the dummy next to it, but do not mutilate this tooth in forming the step as described by Dr. Hinman.

In the construction of this hood for a bicuspid, where there is a mesio-approximal, a disto-approximal, and an occlusal cavity, take the iridio-platinum pin, extend it across the grinding surface and bend it at right angles to the gingival portion of the disto-approximal cavity, allowing the horizontal portion to extend, for the purpose of soldering to the dummy and also to avoid cutting. I can say that I believe it to be the strongest and most artistic inlay and abutment that can be made.

Dr. J. Bond Littig. I only want to make a few remarks in regard to the small pinholes spoken of in the paper as forming the basis of the hood, or the attachment to the hood. It is generally considered that they will not hold. I can verify the fact that they will, because probably most of you remember how many of those tips of porcelain and of gold I have put on teeth, held solely by the wires inserted in those little holes. They are there to-day. I put on three or four for a patient who lost most of the back teeth, and had to chew on the front teeth. That was ten to fifteen years ago. That person was in to-day and they were intact. The attachment is perfect and the hood attached with those pins will stay without any trouble.

The attachment of the wire Dr. Shields speaks of in forming the bridge is certainly an improvement over the simple soldering of a base from approximal surface to approximal surface; but when the inlay has been filled up to the extent shown a strong base will be secured, and I think there will be little danger of its moving.

Dr. Sanger, Orange, N. J. I would like to have Dr. Hinman give us his method of making the inlay.

Dr. S. G. Perry. In regard to gold inlays, it might have been fair to assume that when the porcelain inlay came, it would be used for more than its legitimate purpose; that is, for the restoration of portions of teeth that were exposed to view, and that naturally—through the enthusiasm of some dentists—it would be

finally used quite indiscriminately on the surfaces of the posterior teeth. I have used the porcelain inlay somewhat on approximal surfaces of bicuspids and molars, and very often on buccal surfaces, but very few times on occlusal surfaces; never with great satisfaction except on buccal surfaces, but always with a feeling of uncertainty, owing to the brittleness of the material itself. I have felt that the profession might go too far in making restorations with porcelain in the posterior teeth. You may remember that I have been a crank for many years on the esthetic side of the question, and the great desirability of restoring everything in the front of the mouth with porcelain, so that it would not show; but in hidden places we need not, since the advent of the gold inlay, consider the porcelain inlay at all.

FIG. 10.

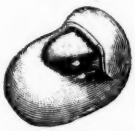

FIG. 11.

I have been ready to be sympathetic toward the use of the gold inlay, and while I have not attempted many I have been ready to approve it, and to welcome it in the restoration of all unexposed portions of the teeth. I think the gold inlay can be made almost as easily, perhaps, as can the porcelain inlay. It has one great advantage and must always have it over the porcelain inlay. That is, that a very close joint can be made in the beginning if the work is properly done. After it is set, one can still improve it by the burnishing of the edges of the gold and the adjustment to the cavity margins, which cannot possibly de done with porcelain. One can go so far as to tease out the little line of cement, and the gold is so soft that it can be burnished down to take the place of the slight deficiency of cement that has been taken away; or one can even crush out the cement. It is possible to secure as perfect margins as with gold fillings. Some difficulty may be experienced along the gingival borders, but with properly shaped burnishers it is still possible to make the margins secure.

Dr. Ottolengui mentioned a point in reference to setting inlays, namely, that in the setting of an inlay of any kind by

means of cement the personal equation is eliminated. With the utmost carelessness and with inexperienced hands any inlay can be placed in a cavity and a perfect joint secured. The most finished operators with gold cannot always make a perfect edge. Whether it be a porcelain or a gold inlay, a better fit and a better condition around the body of the inlay than could be secured by the use of any kind of filling material. So the point is, What will your margin be? What sort of fit can you make there? If you will set your gold inlay you will be perfectly sure to make a perfect fit except at the margin, and if you can make that perfect you will have something very satisfactory.

To come to the paper, I must entirely agree with Dr. Littig, and it is to him we must first give the credit of first placing porcelain tips by the use of the little pins in the ends of the teeth. Metallic caps or plates set with pins can be placed in the substance of the teeth on their ends, or on the surfaces of the back teeth, or on the sides of the teeth.

I have used the hoods also, not quite so distinctly and so freely as Dr. Hinman has done, but with very satisfactory results.

Dr. Hinman's paper will be of great benefit because it will set us thinking; much will be done in that direction to the good of the patient and profession. This system appeals to me because it does not imply disturbances of the gum, and if there is anything I despise, it is putting any kind of a band or attachment around a tooth which will in time destroy the natural attachment of the gum.

I only intended to say just a word, and that was on the advantage of burnishing the gold inlay, which cannot be done with the porcelain one.

Let us use the porcelain and let us be happy that we have it where we want to beautify the mouth; but I beg of you, particularly the younger men, do not spend too much time in putting porcelain in the back teeth, because it is brittle and will crumble, and will be a delusion and a snare. Do not promise your patients that you have done something permanent. Look at your gold fillings thirty-five and forty years old, doing splendid service to-day. Do any of you think your porcelain inlays in the posterior teeth will last that long? You know perfectly well, in your secret hearts, that they will not.

Dr. Van Woert. You all remember Dr. Straw of Newburgh. About fifteen or eighteen years ago he had a clinic and demonstration in my office at Greenpoint, as it was called then—now the Seventeenth Ward of Brooklyn. The question arose as to the stability of malleted gold on the ends of teeth, and of gold tips or fastenings such as described by the essayist this evening. My portion of the work consisted in restoring the tips of three or four teeth in Dr. Straw's mouth. Dr. Geran and Dr. Ottolengui did some of the work and there were others who also operated

FIG. 12.

FIG. 13.

FIG. 14.

FIG. 15.

FIG. 16.

FIG. 17.

on him that day. I know for a fact that within six months of his death the made or manufactured tips that were put on were intact. Those that were put on with a mallet had disappeared and had been renewed. It brings us to one point that is the all-important one; namely, that the mainstay of any filling is the cement. If you can protect the cement from the fluids of the mouth, you have something that will support a filling. I think the cement method of attachment is far preferable to anything we know of.

The porcelain inlay is by far preferable, as Dr. Perry has said, from an esthetic standpoint; but that gold can be manipulated

into the molars and bicuspids so as to be perfectly adapted to the margins is beyond doubt. If a line or a sufficient amount of cement intervenes between the floor of the cavity and the inlay, and the anchorages are secure, I believe it will stand longer than any malleted gold filling ever put in, notwithstanding the fact that I have seen recently fillings in good conditions that were put in years ago by men like Dr. Perry, Dr. Dwinelle and Dr. Atkinson.

There is one great drawback in connection with gold operations—the continual change of gold under the force of mastication when there is no support other than tooth substance. Gold has no adhesive quality to anything, while cement will adhere to the walls of a cavity if it is properly prepared and dried out. If suitable anchorages are made into the inlay there is no question but what they can be made as stable as any gold filling, and the fact that it does eliminate the contact of gold at the gingival or the gum margin is one of the strongest points in its favor.

Dr. Shields. In the matter of gold inlays: When the cavity is properly prepared an impression can easily be obtained with "Premium" gutta-percha. Pour a plaster cast, make an impression in Melotte's moldine, and pour the die. The gold can then be swaged into the cavity in the Melotte's metal die; then it is burnished in the cavity, and after filling it slightly with solder, burnish it again to the cavity; and repeat this, adding solder and burnishing two or three times to make the inlay fit perfectly. In my hands they answer the purpose beautifully in cases fitted for resort to them. In the matter of small pins for the retention of tips, of course they will hold. In my discussion I said that no reference had been made as to whether the teeth were tight or loose teeth; but whether they be tight or loose, or in the mouths of young or elderly people, I consider it absolutely unnecessary and harmful to the pulp to cut a tooth for the purpose of forming the two steps described by the essayist.

There is no question in our minds that inlays have come to stay. The abuse of the porcelain inlay has brought about to a certain extent the introduction of the gold inlay.

Dr. Rhein. I think the main point of advantage accruing from the gold inlay is in the cessation of the abuse of what is known as the gold-shell crown. If it should do away with one-tenth of

the frightful malpractice that that shell crown has brought about, it will be a great blessing in dental work.

In my own mind from this will the greatest advantage come.

There is one little point I want to touch on. The method of utilizing the inlay for bridge work that was presented to-night does not appeal to me from a practical standpoint. I agree almost entirely with what Dr. Shields said on the subject, but I go considerably farther than that. In the majority of cases where this work is used for bridge work we have to begin with a diseased condition of the pulp. Everything that he has shown us this operation will do will tend to a further irritation of that organ, tending to produce what I have seen so often—the death of the pulp under work of this kind, and consequent abscesses at varied periods.

In other words, I am very firmly convinced that when we consider the age at which bridge work of this kind is undertaken—and I am supposing that under natural circumstances it is past the maturity of life that this work has to be introduced—it is better to remove such pulps at the outset. I can see at the present time very little excuse for a permanent or fixed piece of bridge work. The advantages of a removable piece of work are too patent for me to discuss. We are all acquainted with them. In the majority of these cases that have been shown by the essayist a removable piece of work would appeal to me as one that would not only be more permanent in its nature, but one that would certainly be more cleanly, more easily removed if circumstances demand it, and one that would preclude the possibility of abscesses caused by disorganized pulps.

Dr. Ottolengui. I have made this point as one I discovered only since making gold inlays—that is, the fact that the inlay is practically indestructible under a mallet, and enables you with mallet force to insert it with less cement between it and the walls than can possibly be obtained by any filling method. I take it that the less cement lining there is, the better. I want to make another point of difference between the gold and the porcelain inlay. In the porcelain inlay the matrix is stripped off, and consequently there is just that much discrepancy in the fit and that much space for the cement, this being likewise the reason why the inlay is not set with a minimum of cement. In the gold inlay

the matrix is utilized. This is a point of difference in addition to the one brought out by Dr. Perry, that with careful burnishing an absolute joint will be made between cavity walls and inlay.

Dr. Rhein. What I wish particularly to emphasize is the danger of running too far with the gold inlay, as we have with the porcelain one. I expect to use the gold inlay very extensively. It was a treat to me to witness the clinics in Portland of Dr. Nyman and Dr. Thompson of Chicago in the making and inserting of gold inlays. I never have seen anything more beautiful, and I expect Dr. Nyman will give a clinical exposition of his gold inlays here this season, when you will all have the opportunity of seeing his method of inserting them. I do not wish to detract from the usefulness of the inlay, and I merely said what I did in regard to Dr. Perry's remarks because I agree with him. There are two sides to the question, and it is the individual dentist who has to decide what is best for the given case. It is the old question of the man behind the hoe. I feel like saying to the young men, Do not run off too fast with this gold inlay practice any more than with the porcelain inlay, where you have a simple ordinary gold contour to build. Where you know you can make a permanent operation with no question of cement margins washing out when the period of immunity to caries ceases to exist—bless your lucky star that you inserted a gold filling.

Dr. Ottolengui. If Dr. Rhein had disagreed with me I would not have answered, but I want to make the same kind of confession Dr. Reitz made. He says that one of his fillings came out and he cemented it in, and then he admitted that it had not been properly inserted. One of my fillings came out and just about that time I had published a letter from a practitioner in England, stating that he had had two or three fillings come out, that he had cemented them in, and that they stayed in the cavities even better than before. With that in view, and finding there was no fracture of the walls and that everything was all right, I cemented mine in. I claim it was not possible to anchor a filling in that tooth in the way gold fillings are anchored in, but it was possible to anchor it in with cement, as is proved. That was a long incisor with a living pulp and a cavity embracing practically one-third of the tooth—a long, thin, fragile tooth. The gold filling that was in stayed two or three years, and then it came out. It has stayed

in five years since it was cemented. I have not the slightest idea of giving up gold fillings. I expect to use nine gold fillings to one gold inlay, just as I have done with porcelain; but the place for the inlay is the place where one cannot put in a good gold filling, and where instead of that you do makeshift work with amalgam or gold shell crowns.

Dr. Hinman. I do not want you to think that I have gone rampant on the subject of gold inlays and hoods, and that I put them on anywhere, whether it be an incisor or a third molar or the back of the head. The idea seems to be prevalent that I was trying to make a universal application of it. We had an old governor in Georgia during the war. Somebody asked him what made a man. He said, "Judgment." It is judgment you must have. The gold inlay is not universal in its application, but it does good service in some cases.

Dr. Shields spoke about cutting steps in the molar and mutilating the molar. I do not mutilate it any more than you do when you put in an amalgam or gold filling, if you prepare the cavity properly. If the tooth has a cavity in the mesial surface or the crown, I would utilize it, of course.

I did not take up the question of tight or loose teeth because I had reference to tight teeth only. The idea of using the wire has possibly an advantage, in the manner Dr. Shields spoke of. I have not tried it, but like everything else I hear of that I think is good, I will try it. Wherever there is a good broad surface for anchorage, I have never had one of the hood and inlay anchor bridges break off. If it broke, someone else got hold of it. You know those things happen sometimes. There is absolutely nothing against the pins Dr. Shields spoke of, and if you think it adds to the strength of the device, why, use them.

I want to put in a disclaimer right here. I have heard several say this was Hinman's method. I do not claim anything like that. The making of the inlay Dr. Ottolengui says is my method, but it is not. It is a combination of methods I have had from several men, and I am going to describe how to make it. There are in the procedure some points that I have obtained from one man, some from another, and some I do not know where from.

I did not discuss the question of making the gold inlay. I was

trying to introduce this hood, which I want you to understand, and which I believe is a good thing, and something strong. Dr. Shields brought out the preparation of that incisor with a staple and a pin (referring to model not intended for illustrative purposes, but put in by mistake). In printing offices you have what is called a printer's devil, and sometimes I think in dental offices we have assistants who could be called by that name. Any person in the world would know if you cut a tooth in that way you would kill the pulp; but you can use the double-step three-pin on the central and not destroy the pulp.

There are certain cases in which this inlay and hood can be used successfully, and I present it with the idea that while there is some good in it, it is not, however, universal in its application.

Dr. Rhein tells us to do away with the gold crown. That is exactly what induced me to take up this work, because if there is anything I despise it is a gold crown, and I have yet to see a gold band fitted around the root by any operator in the world where there was not some inflammation around the margin, and in many cases a deposit. I do not use them—except, of course, in cases that cannot be treated otherwise.

The case Dr. Ottolengui showed to-night was one in which the tooth had been cut down and a gold crown inserted, for reasons which it is best not to enumerate. Dr. Ottolengui took the crown off, examined it, and finding that the tooth had not been badly mutilated, made a gold inlay and placed the tooth in occlusion.

These models were passed around without an explanation of what they were intended for. The case in which the bicuspid is replaced is for a special case, and is cited in the paper. In reading the paper, I laid stress on that.

The making of the large gold inlay in front to support the lateral incisor was a special case. I would not begin to think of putting a large inlay in the anterior surface of an incisor. I have as much respect for a patient as I have for myself. I do not want to display a lot of gold.

We will get an abuse of the gold inlay because some men will try to put it everywhere. Dr. Rhein says that there is no advantage in the gold inlay. His viewpoint and mine are different. It is a time-saver, and one meaning less strain on the operator and the patient. You cannot always obtain the consent of

patients to submit to the long and tedious operation of filling with gold, especially where it requires the restoration of a large portion of the occlusal surface. You can restore it with an inlay, thus saving much strain on the patient. Of course, the question of permanence we can only judge of in from ten to twelve years. Many of them have been in as long as that. Dr. Rhein does not avail himself of the cement lining—except in the one filling that came out and was reset.

In the occlusal surface of children's teeth, where there is much decay, we usually fill with cement. I find the gold inlay wonderful in the sense that it obviates the necessity of filling certain teeth temporarily. I fill the incisors in young people with porcelain. I do not fill with cement any more. I can do it with just as little pain. It stands in Georgia; I do not know whether it would stand here. The climate is different.

Dr. Rhein has a way of condemning things, but in this case, as he has not tried this anchorage, he is not a fit judge. As for removable bridge work, I have seen just as bad failures in the hands of good operators with removable bridge work as with fixed.

Now about the gold "dutchman" or wedge. That is a matter of technique. The gold dutchman is put there with the idea of preventing the solder from pulling the inlay out of the investment slightly, and drawing it out of line. It is made of 22-k. 28-gauge plate, filed thin, adjusted accurately and with care, because it can be pushed in too tight; then the 18-k. gold, in an infinitesimal amount, is dropped in, and no shrinkage will result.

Now with regard to the question of making the gold inlay. There are as many methods of making it as there are of going to Atlanta. The way I take is the direct one. The impression method has been touched on to-night, but in a very roundabout way. There is an easier way by the impression method. After the cavity is prepared take an impression in fine modeling composition. Have the cavity wet, and the modeling compound dry-heated; take the impression, chill it thoroughly, remove it from the cavity, and fill the impression with amalgam—preferably copper amalgam. Take the matrix metal and burnish it to position on the amalgam model. You all know that I use this little mallet. It is like a man's Bible ought to be—always with him. Use

a little pledget of wet cotton to mallet on, and you will not tear the matrix. When you burnish it down the matrix is practically made. Some trust that matrix and finish up their inlays. I do not do that. The matrix is then thickened, returned to the cavity and reburnished. I have already described the making of the inlay out of the mouth. I make a matrix of a piece of pure gold 3-1,000 inch in thickness, which is passed between the teeth and forced to place tightly with a peldget of wet cotton, being careful that it reaches over the gingival margin. With the thumb press it down over the occlusal surface. Let me deviate just a moment: The gold inlay must be anchored in such a manner that it will not be displaced by the force of mastication even before it is cemented in the cavity.

Mallet the wet cotton right down between the teeth in order to force the matrix over; then put another piece of wet cotton in the occlusal surface, mallet it down, remove the matrix, and trim it approximately. Anneal it and return it to the cavity, finishing the work with flat and round burnishers. If there are any tears in the matrix except on the margins, mend those tears with pellets of gold. Press them right down over the hole, and they will remain where placed. Thicken the matrix with 22-k. solder, but do not let the solder run over the margins if it can be avoided; then return it to the mouth and reburnish it after the matrix has been thickened. Remember that point. Have the matrix dry, and take some modeling compound dry-heated, roll it up into a cone, and force it up with the thumb. Have the patient close the teeth to occlusion, and press the compound well to the buccal sides of the teeth with the fingers, the patient pressing the tongue on the lingual surface. Chill and remove the compound, when the matrix will come out with the impression; then you simply make a small articulator of plaster, running the side that contains the gold with sump. I am speaking of cases requiring considerable restoration, as, for example, occlusal cavities in molars.

Build up all the lost parts of the tooth with hard wax. On the occlusal surface annealed pure gold 1/1,000 inch in thickness instead of 3/1,000 is burnished. Bring the little articulator together and mash the gold into the wax, trimming the gold on the approximal surface exactly at the point where the knuckle is

wanted. Do not let it lap; bring it just to the point you want it. I employ in connection with the building-up of inlays a little contrivance which I have used in the past in the construction of Richmond crowns, which I suppose has also been used by other practitioners. I make what I may term a vent. After investing I fill the inlays from either the distal or mesial side, at the point where the piece of gold 1/1,000 inch thick laps over the wax on to the tooth-model. I raise it a little, and put in a little roll of wax. I then cut the tooth from the model and invest it with the little roll of wax downward. Invest it with the distal surface down, wash out the wax, and a little cup easy to fill will result. The hole will be all the way through, and you have your vent.

Dr. Littig: Do you cover the occlusion with anything?

Dr. Hinman: Yes. I cover everything except the wax on the mesial side. Underneath, this little bit of wax is sticking down, and when it is washed out there is a hole produced extending throughout the investment, which acts as a vent and prevents bubbles in the solder.

Dr. Rhein: Why don't you make the vent on the inside—the side corresponding to the floor of the cavity?

Dr. Hinman: Because it would require cutting a hole through the matrix—and that would perhaps result in the solder running on the surface next to the tooth.

Dr. Rhein: I do not think so. I have seen it made that way.

Dr. Hinman: You have seen them filled from that side?

Dr. Rhein: No, the matrix had a hole cut through originally.

Dr. Hinman: You want the solder to be in large pieces. With a big blast blow-pipe heat the matrix sufficiently on the under side, so that the entire mass may melt at once.

Dr. Curtis: Did you ever try having the solder in round balls?

Dr. Hinman: No. I use the heavy pieces.—*Dental Cosmos.*

THE NECESSITY FOR GREATER INTELLIGENCE IN PERFORMING DENTAL OPERATIONS. By C. N. Johnson, M.A., L.D.S., D.D.S., Chicago, Ill. The reason your essay committee assigned this subject for me was probably due to the fact that I have so frequently stated in public and in private that the most unfortunate thing connected with the practice of dentistry was the tendency with many of our members to fall into

routine methods of doing things without a wise discrimination in each individual case and without a sufficient study of the particular conditions present as a basis for a particular line of action.

I have in my inmost heart a very liberal fund of charity for the dentist who makes mistakes. The nature of our calling is such that to practice it to its highest possibilities in all the varied conditions which confront the operator in his everyday work calls for a rare combination of acuteness of observation, concentration of energy, calmness of judgment and infinite discrimination. And if a man fails in some of these requisites at times it is not to be wondered at. But when we consider the issues at stake in our operations, when we realize that it is often the saving of a human tooth which is involved, and that the loss of one tooth may mean the disarrangement of articulation on one entire side of the dental arch, we cannot lightly look upon our responsibilities nor shirk the highest performance of our duty on the ground that a given duty is difficult.

There are so many ways in which practitioners may increase their usefulness to humanity by the exercise of a higher order of intelligence that they cannot all be enumerated here, but in a general way it may be stated that the first essential to the best service is a constant study of the conditions which surround our operations, a fact which has long since become the watchword of this club. Many men simply go on day after day filling cavities in teeth, adjusting crowns and bridges to roots, and inserting artificial dentures with little consideration beyond the cavities, the crowns or the dentures. The forces at work in the given case tending to affect materially the result of the operation are seldom properly studied. I think it was a member of this society who once reported a case in which an operator had gone to the extreme in making broad anchorages in a cavity for the retention of a filling against the tipping stress of mastication, cutting extensively for this purpose to the great discomfort of his patient, when upon examination it was found that there was no tooth in the opposite jaw to occlude with the tooth to be filled. Surely greater intelligence was needed in a case of this kind.

I once saw a student place a bur with its end against the floor of the step in a proximo-occlusal cavity in a bicuspid and start to drill straight toward the pulp. I stopped him and asked why he

did that. He said: "You told us in one of your lectures to make the axial wall as nearly perpendicular as possible." And yet some men wonder why dental teachers have gray hairs. It is often stated that you cannot put intelligence into a brain that has no native capacity for it. To a certain degree this is true, and yet it is often possible, by the proper kind of appeal, to stimulate to thought men who of their own accord never would think, and such a thing is no small achievement.

To-day as I look at the mental status of the profession, the chief office of the advance guard, it seems to me, is to try to develop the thinking habit in the rank and file. There always will be pioneers of thought who go ahead and break the virgin soil, but the bulk of the harvest must be gathered by the masses, and the important thing is to teach the masses how to properly reap. It matters not so much that a few men may know a great deal about dentistry, but it matters seriously that the large majority are capable of rendering efficient service to their patients. And this service can be rendered only by the exercise of intelligence in the planning and performance of operations.

I saw a short time ago a case in which all the bicuspids and molars had been lost on one side of the upper jaw. The cuspid had been crowned and two artificial teeth to take the place of the cuspids had been attached to this crown without anything to anchor them at the other extremity. Thus one root was carrying three teeth. This was not only bad judgment on general principles, but in this case it was particularly bad, because of the fact that each of the three incisors next in line with the cuspid carried a separate crown. If these four crowns had been joined together there would have been much greater hope of service for the dummies, but as it was the cuspid root had become so loosened by the leverage upon it that its loss in a short time was inevitable. And let me say in passing that in no department of our work is there manifestly a greater need for discrimination and judgment than in crown and bridge work. Clearly in many instances all the laws of physics are ignored, as well as the phenomena of mastication and the structure and function of the peridental membranes. It is not in order for me at this time to go into a consideration of the forces of mastication, as they relate to the con-

struction of bridgework, but this should be most carefully studied by every dentist who attempts to do this kind of work.

This question of stress affects us so materially in our everyday operations that at the risk of dealing with an altogether trite subject I must say something about it as it relates to the anchorage of fillings. I am more and more impressed with the very great difference in the manner in which different individuals use their teeth in mastication. A close study of the landmarks of mastication as left upon the teeth of patients will reveal this in no unmistakable manner, and it is in this line of observation that I make a plea for closer application on the part of practitioners. These landmarks of mastication are very eloquent of what is being exerted in a given mouth. In some cases they show conclusively that if fillings are to remain in place they must be anchored in the firmest possible manner, and the filling material itself must have sufficient bulk to withstand severe and repeated impact. The wear on fillings is sometimes enormous, and the wonder is, not that fillings are occasionally displaced, but that they remain seated at all. The chief factor in these cases is not always the greatest possible stress that can be exerted by the jaws on closure, but the habitual usage given the teeth in mastication. This is manifest by worn places in the occlusal surfaces, by indentations in fillings, and by splintered enamel, all showing hard service. It is here that great intelligence is needed in repairing the ravages of decay and doing satisfactory work. When a mouth like this is encountered no ordinary methods of operating will suffice. Oxyphosphate of zinc and gutta-percha in any position of stress are almost worthless. Even amalgam is soon crushed out of form unless the cavity is made with a broad flat seat and the filling material very thick. Gold fillings themselves are not exempt from injury unless the very best mechanical operation is made, and in those positions, in which it is difficult to secure perfect results in the manipulation of foil, it will be found that a properly constructed gold inlay will withstand the stress to better advantage than any other kind of filling. It is in these cases that I have found the very greatest usefulness for gold inlay work, that I have been able to secure better results than would have been possible in my hands with any other kind of reparative process. Many of these cases are too readily yielded

up after a few failures with the ordinary fillings, and consigned to crowning, when they might better be preserved by proper methods of filling or by the use of inlays. And in this connection let me say that inlay workers have in many instances followed the tendency of relying too much on oxyphosphate of zinc and faith to retain their inlays in place. Cavities should be prepared with appreciable depth and with walls nearly parallel so that besides cement there shall be some frictional retention to hold the inlays in position. The intimation that cement has such wonderful adhesive properties as to hold an inlay to a cavity on the same principle that glue will hold two pieces of wood together has given rise to an unwarranted laxity in cavity preparation resulting in the loss of many inlays. We cannot escape the mechanics of an operation even in inlay work, and this is particularly true of the cases under consideration in which the aggregate stress on our work is very great. It seems to me that there is needed a greater intelligence in planning our work and in the technique of carrying it out.

I have in mind some interesting cases that exhibited a decided tendency toward hard usage of the teeth in mastication. One in the mouth of a lady who came to me years ago wearing bridges on her upper teeth. The four incisors were in one piece, and there was a bridge on either side from the cuspid distally, making three sections on the upper jaw. Although only recently constructed, the bridges were badly forced out of position. The incisors protruded at such an angle as to push the upper lip forward unpleasantly, and the entire case was going rapidly to ruin. The difficulty lay in two directions. In addition to the very severe use to which she naturally put her teeth in masticating, the dentist, in constructing the bridges, had allowed the jaws to drop too close together, thus admitting the lower incisors, allowing them to very nearly impinge against the gum, lingually of the upper incisors, and force the latter forward. A little study on the part of the dentist in planning this work would have shown him the inevitable result of such an arrangement of stress. The remedy consisted in opening the bite on the molars and bicuspids, and readjusting the upper incisors into proper alignment. The reconstructed case has now been worn

four or five years, and, although the gold is badly battered in places, the work is still doing service.

Another case was in the mouth of a man who wore a set of artificial teeth on the upper jaw and who had ground the lower natural teeth nearly to the gum line. I never saw such havoc wrought with artificial teeth before, and it was necessary to bridge the lower teeth with a heavy gold bridge to save them from the fate to which his previous dentist had consigned them, viz., extraction. The patient informed me that he found it necessary to have a new set of upper teeth made every year or so, and this I learned to be a fact. He would literally grind the porcelain and gold together in a way to wear and splinter the porcelain and batter the gold so that the rough edges would have to be smoothed quite frequently. An examination of the occlusal surfaces of his upper teeth at any time would show the porcelain coated with gold where he had ground them against the lower bridge, and unless the occlusion was very carefully arranged along the median line a split of the upper plate would invariably occur. I looked forward with some apprehension to the time when this excessive pressure would cause absorption and softening of the upper aveolar ridge, but before this occurred to any appreciable extent the patient was stricken with Bright's disease and died.

Another case in which I came to grief with some of my fillings, and in which I should have used more intelligence at the outset by carefully studying the landmarks of mastication, was in the mouth of a gentleman who had, when a young man, lost several teeth and then suddenly awakened to the fact that he wanted to save the rest. I filled some cavities in his molars with amalgam and wherever opposing cusps encountered my fillings the latter were promptly crushed out of shape and out of position. No amalgam that I could use would long withstand the onslaught of those cusps. Not only this, but the enamel itself suffered. Splinters were broken from it and sometimes appreciable slabs. The cavities were large, the man not in good circumstances financially, and I had used amalgam to save his purse. But something had to be done. Gold fillings of the size and in the location of some of the cavities would have been an exceeding tax, and I was not sure that even they would stand the impact for any time. I therefore adopted the plan, which

I found to be a good one, of making gold inlays from time to time whenever an amalgam filling failed. These inlays were made with 18-karat solder, and let me say, they were made solid. I should have been doubtful of the fate of hollow inlays in such a case. The enamel margins were very freely cut away and the gold extended over them, and this kind of work proved the most satisfactory I could do in these teeth. I have often been curious to know what would have been done in such a mouth by those operators who claim to use porcelain exclusively in all kinds of cases. Of one thing I am certain, that porcelain would have been chipped and smashed in a very short time after its insertion. I have mentioned only a few cases of the many that occur in practice, cases requiring a high degree of intelligence to accomplish the best results, intelligence to be gained only by a constant study of the conditions present as manifested by phenomena in the mouth, which prove an eloquent index to the acute observer.—*Dental Review.*

THE DEGREE OF ASEPSIS NECESSARY IN DENTAL SURGERY AND THE MOST PRACTICAL MEANS OF ATTAINING IT. By J. H. Badcock (London), L.R.C.P., M.R.C.S., L.D.S. There are few expressions occurring with greater frequency in modern dental literature than "asepsis" and "aseptic," and rarely have words been more abused.

The very title of my paper is a contradiction in terms, for "asepsis" means absence of germ life, and, so far as operations are concerned, is the expression of an unattainable ideal. It is the ideal of the general surgeon—an ideal whose pursuit has rendered possible the vast strides made by surgery during the last twenty years. Ought it to be also the ideal of the dental surgeon? The answer must be either "yes" or "no." If, as is often assumed, it be "yes," then all the conditions of dental practice must be revolutionized, and you and I, who are content with less, are guilty of gross malpractice.

Let us face the facts, and try to discover whether asepsis, or as near an approach to it as the general surgeon is able to accomplish, be a necessity in our work. Ought we to remodel our surgeries on the lines of the modern operating theater, to work with sterile hands, and instruments direct from the antiseptic bath; and

if not, with what lesser measures of precaution may we rest content?

It seems to me that our profession has never taken the question seriously. There is much talk of asepsis and antiseptic precautions, while in practice there is often failure to reach the level of ordinary domestic cleanliness.

It may be helpful in our attempt to reach practical issues if we consider: (*a*) The ends the surgeon has in view when he takes his elaborate precautions against infection; (*b*) to what extent the conditions of the surgeon's work are those of ours.

The elaborate precautions of the surgeon are taken for the purpose of obviating:

(1) The transmission of germ or virus from one patient to another (effected by sterilization *after* operation).

(2) The infection of the wound by germs from the air or any other source (effected by sterilization *before* operation and the use of sterile instruments).

The conditions under which he works are as follows:

He has to deal exclusively with vascular absorbent tissues, and his operations involve the division of their protective covering of skin or mucous membrane. He is always able to sterilize the skin —and often the mucous membrane—before making his incision, and he is able to keep the wound in a sterile condition until healing takes place.

The operations of the dentist are very differently conditioned. The greater part of his work is done upon the teeth, tissues neither vascular or absorbent, except as regards the pulp, and this—when operation upon it is necessary—is usually already highly septic. No infection of the patient through the medium of the dentine is possible, so far as we know. There is, however, evidence that bacilli may enter the body through the dental pulp. In a number of cases the dentist does cut or wound the mucous membrane, but under conditions which make even partial sterilization beforehand, and, much more, continued asepsis, impossible. The mouth is designed for the inception and mastication of food—septic food—food which has been exposed to infection by air, water, and a host of living things in the way of animals and insects; and in the mastication of food as it occurs in Nature, the mucous membrane of the mouth is liable to wounds from fish-bones, splinters of

animal bone, husks of grain, shells of nuts, thorns and many other things. The mouth always swarms with bacterial life, and any such wound would be deeply infected from the mouth itself. Nature took all these things into consideration. We know how marvelously well wounds of the mouth heal, in spite of their being always bathed in germs, and though this may be partly due to the generous vascular supply of that region, it is probably largely owing to a special power which the mouth possesses of getting rid of bacteria.

You will remember that Miller, after rinsing the mouth with a fluid containing an enormous number of bacteria, found that they rapidly disappeared, and that within a few hours there were no more than the normal number present. Now it seems to me, from the conditions before mentioned, that the dentist may safely disregard infection by adventitious germs, and trust to the safeguards which nature has provided; but he must be by that much more scrupulously careful to make certain that everything which has been in contact with the patient be completely sterilized before being used again, and I believe that this may be effected without adding much to our daily burden or going far beyond the necessities dictated by an ordinary sense of decency and cleanliness.

For the purpose of discussion I will take the foregoing for granted, and pass on to this question of prevention, in the hope that you will speedily detect the weak points in my armour and help me to strengthen them.

The hands should be thoroughly washed and the nails brushed immediately after treating a patient, and, if any interval elapse, immediately before seeing another. (Personally, I prefer the patient to witness this precaution.)

In cases where one is conscious of having come in contact with any virulent infection, the hands should be thoroughly cleaned by means of very hot water, soap and a nail-brush, and then well scrubbed with a 2 per cent solution of lysol or a 4 per cent solution of lysoform, and finally immersed in a solution of perchloride of mercury, 1 in 1,000, for not less than two minutes. New rubber dam should be thoroughly washed with soap and water, or, better still, boiled before using. Anyone who has not practiced it will be astonished at the amount of impurity removed in this process, and it certainly offends against the canon of good taste to allow the

patient to suck this off, though there may be no question of any specific disease germ.

I have never been able to see any objection to the use of a rubber a second or third time, *provided that it has been boiled for ten minutes* and thoroughly scrubbed with soap or lysoform and water. I should much prefer it to dirty rubber straight from the depot. But there must be no mistake about the sterilization. Silk may be used from a reel inclosed in a box suspended by a wire, pieces being cut off as required.

Saliva tubes, if of glass, should be of clear glass, so that one may be able to see whether they be clean or not. The only object in using colored glass is the concealment of dirt. A fresh tube should be used for each patient. Immersion in strong hydrochloric or sulphuric acid and subsequent rinsing will keep them bright. Boiling makes them cloudy. Metal tubes should be boiled; there is no other way of dealing with them. A supply of clean tubes may be kept in the surgery in a weak solution of lysoform, in a covered glass dish. Each patient should be given a clean tumbler. A napkin should never be used twice without washing, and the washing must be thorough. The cheap napkins which are now sold to be used once and thrown away have much to recommend them.

Impression trays should be thoroughly washed and polished when the impression material has been removed. Impression material may be effectively sterilized without damage by placing it in a double saucepan with a lid having a hole in it for a thermometer, and keeping it at a temperature of 160 degrees F. for one and a half hours. For this information I am indebted to the courtesy of Mr. Kenneth Goadby.

Immediately after use all instruments should be wiped and then sterilized. The process of boiling is inconvenient in many ways and bad for the instruments, even though a small quantity of soda be added to the water, and I think that immersion in an antiseptic solution is to be preferred. The instruments should be wholly immersed—not merely the points. One is much more likely to infect a crack at the commissure of the lips with the handle of an instrument than to infect the mouth with the point, the surface is larger and capable of conveying a larger dose of infection. After remaining immersed for some minutes each in-

strument must be carefully wiped with a clean cloth kept for the purpose; this mechanical cleansing is of the greatest importance—without it a very much longer immersion is necessary. It is convenient to keep a separate tray for small instruments, such as burs, clamps, stones, etc. These small things should be cleansed with a wire brush kept in the solution.

The handpiece should be carefully wiped with the antiseptic. The wet syringe and blower should both be immersed; the chip blower may have its point left out so that it keeps dry inside—this part will be sterilized in the flame when it is warmed previous to use.

When instrument makers realize that we intend to sterilize our instruments to the best of our power they will help us by making each as easily cleansable as possible, leaving out useless roughenings and ornamental markings which have long disappeared from surgical instruments.

The handles of all instruments should be made of metal, and if formed of a separate piece the joint should be made perfectly smooth. Engine handpieces are capable of vast improvements in this matter, and it is particularly necessary that they should be easily cleaned, as they cannot be immersed. Forceps may be boiled after cleansing, but it is sufficient to treat them with an antiseptic if special care be taken to clean most thoroughly the insides of the beaks, preferably with a wire brush.

Mr. Goodman, in an interesting paper on this subject, read at the Annual Meeting of the Western Counties Branch, stated that he keeps his forceps permanently in a 3 per cent solution of lysol, and the practice is an excellent one, though not necessary if they be treated before and after use. The hypodermic syringe should be emptied after use, and with the needle selected boiled before using, or, instead of boiling it may be washed out with an antiseptic and left therein; it is not safe to trust to needles sold as ready sterilized.

The most difficult thing to keep clean is the cabinet in which we keep our instruments; indeed, to the best of my knowledge no maker has produced a dental cabinet which can be kept clean. A so-called "aseptic metal cabinet" has been made, but metal, even in combination with glass, does not make asepsis; and ill-fitting metal drawers admitting the dust which can by no possibility be

cleaned, by reason of their sharp angles, are among the dirtiest things of all. What is wanted is a cabinet, it may quite well be of wood, whose well-fitting drawers are lined with a washable impervious material and have no corners inside, which can be sponged out clean with an antiseptic in one minute.

For some time past I have used a bracket table lined in similar fashion, except that the rounded corners were of ebony. Vulcanite is an improvement. For handles, rings may take the place of knobs, so that instead of fingering the knob you may open the drawer with the end of the instrument you may happen to be using, or if that be soiled, with a stout match. But while you are thinking of buying a new cabinet or having your drawers relined you may be content to cover the bottoms of them with loose linings of white paper, to be removed as soon as soiled. It is the next best thing, costs nothing, looks nice, and shows up instruments conveniently.

Paper may also be used for the bracket table—a fresh piece for each patient.

All this may sound very elaborate, but is really very simple and easily carried out. The apparatus you require is a sterilizer long and large enough to take your instruments, and sufficient solution to cover them, and two or three glass dishes, one for your saliva tubes and one or two for small things, such as burs, clamps, stones, etc.

When operating, nothing that has been touched with soiled fingers is returned to the drawer—everything is left on the paper cover of the bracket. When the patient goes, any instrument which has blood or *débris* upon it is wiped with the napkin that you have been using; then all are taken up with the paper cover and put into the sterilizer and a fresh cover placed on the bracket. Or, instead of the paper cover you may employ a glass or enameled iron tray.

While you are getting ready for the next patient, if you are busy, your maid can lift the wire basket containing the instruments out of the sterilizer on to a photographic dish to drain, and then wipe them and put away each instrument. This she will do with a very little training, especially if you mark the instruments according to the drawer to which they belong. To prevent waste

of time it is necessary to have in duplicate those instruments always needed to begin with—mirror, probes and tweezers.

All burs and small things you drop, as you have done with them, into a dish, where they may remain until you want them again, or they may be wiped and put away at leisure.

This means some extra trouble and time, especially if you cannot conveniently have the assistance of a maid, but it is well spent. The sense of security that you feel when you see that ugly sore on the lips or that ulcer inside the cheek, in the certainty that you have not caused it, is alone worth the trouble. Very soon the neglect of such precautions will, I doubt not, be held to constitute malpractice, and expose the dentist to liability for damages. The public understands every day more about surgical science, and the more intelligent among them are quick to detect any negligence in this direction.

But there is another contamination, which I have not dealt with. I refer to the various instruments, bottles, handles of drawers, chair adjustments and other things that one is bound to handle with septic fingers if one works single-handed.

The only way of entirely avoiding this is to have an assistant always near to hand one what one wants. Short of this, all one can do is to avoid touching anything unless absolutely necessary, and to touch nothing with fingers obviously soiled. Many of the bottles that one uses could be arranged with hinged covers that could be raised with the end of an instrument.

The antiseptic which I prefer is lysoform—a combination of soap and formaldehyde—it is odorless, except for the faint odor of formaldehyde, and does not rust instruments, which may be left in it for any length of time, and will remain quite bright, with occasional exceptions, when rust appears in one or two small patches, due, possibly, to some electrical action. Mixed with water, it makes an opalescent solution, so that for small objects it is advisable to have a shallow layer of fluid or they are lost to view. If these precautions are carried out I believe that our patients will be at least as safe from infection in our chairs as at their own dinner tables. The habit of operating in a washing coat is increasing in favor in this country, and is an excellent one.

Another point to which I would call your attention is this head-

rest pad, formed of layers of soft paper. A fresh one is exposed for each patient. I find this little device much appreciated.

To recapitulate. The dentist operates under different conditions from the surgeon, inasmuch as the soft tissues with which he deals belong to a part of the body where it is usually impossible to obtain asepsis during operation, and always impossible to maintain it afterward.

The mouth is specially protected against the invasion of bacteria. Hence, it is safe to disregard adventitious organisms in operating upon the teeth. *It is of the utmost importance that there be no possibility of transference of infection from patient to patient.* Hence, all instruments must be rendered sterile *after* use. When operating upon soft tissues they must also be sterilized immediately *before.—British Dental Journal.*

THE QUESTION OF TARTAR FORMATION. By Edward C. Kirk, D.D.S., Sc.D., Philadelphia, Pa. In asking your attention this evening to a consideration of the question of tartar formation, I desire at the outset to state that what I have to present is intended to be merely suggestive and general in its character, and for the purpose of arousing an interest in a line of inquiry which, though it has been but little investigated, seems to me to be promising of fruitful results. As a matter of fact, very little is really known about tartar formation. Various hypotheses have been advanced in explanation of the cause of these calcareous concretions, or earthy deposits upon the teeth, and some investigations of their chemical composition have been recorded, but as to the conditions that give rise to these deposits, or why in certain mouths they are abundant and persistent, while in others they are absent, nothing has been clearly explained; in short, while our literature is comparatively rich in the presentation of devices for removing tartar and in discussions of its pathological effects, but little has been written as to its etiology.

That we have heretofore been principally concerned with the more obvious factors of tartar formation and the study and treatment of the irritative effects of these deposits is but natural, and that our modes of treatment should have been thus far empirical and mainly mechanical is a necessary result of our lack of

knowledge of the deeper factors involved in the causation of these deposits. The progress which has been made in our knowledge of vital processes, especially of the chemistry of nutrition and of the phenomena of cell metabolism, together with the general advance in our knowledge of all departments of the art and science of healing, has compelled a different attitude of mind toward the disease problems which confront us as dental practitioners, so that we can no longer rest content with empirical methods of treatment, but must seek more and more for the original causative factors behind the phenomena of pathology in order that we may devise therapeutic measures that shall be in rational relation thereto and consequently more reliable in their curative effects.

A new attitude of thought has been developed by the results of the study of the etiology of dental caries, of the pathological phenomena of the dental pulp and of the relation of pathogenic organisms to many of the diseases of the soft tissues of the oral cavity, and in proportion as our knowledge of those factors has enlarged so have our therapeutic procedures been modified and improved in accordance with the larger scope of our understanding.

Ravages of Tartar Considered.—The importance of the tartar question is scarcely secondary to that of caries when both are considered as causes of tooth loss. Caries has received the greater share of consideration, perhaps, because in its more advanced stages it is productive of more acute pain and distress than is caused by the destructive ravages of calcareous deposits upon the retentive apparatus of the teeth. Nevertheless I think most practitioners will agree that the number of otherwise useful dental organs annually lost through accumulations of calcareous deposits or by disorders in which such deposits are concerned is fully as great as the total number destroyed by caries. If I have overstated the case I am still safe in saying that the number of teeth thus lost is great enough to demand serious consideration at our hands and an earnest investigation of the problem, with a view to evolving more effective means to combat the disorder, than we seem at present to possess.

Tartar Classified.—I have not as yet had time nor opportunity to make an exhaustive examination of the literature of the sub-

ject, but from such research as I have been able to make it seems clear that two distinct classes of tartar deposits have been established and are generally recognized. The first arises from the precipitation of earthy salts from the saliva and the second from the blood plasma, designated respectively as salivary tartar or calculus, and serumal tartar or calculus, terms indicative of their origin. That form of tartar which is deposited from the saliva has been known and recognized as of salivary origin as far back as the records of dentistry. The blood origin of the serumal variety was first stated and recorded, so far as I am aware, by Dr. J. P. H. Brown before the Georgia State Dental Society at its annual meeting in 1870 (*American Journal Dental Science*, Vol. IV, p. 241). Much doubt has from time to time since then been expressed as to the possibility of a serumal origin of certain calcareous deposits upon tooth roots, but careful study of many cases has convinced me conclusively that such deposits do occur in positions and under circumstances which exclude the possibility of access of saliva. Beside which the analogy of the formation of calcareous concretions in old inflammatory exudates furnishes strong corroborative evidence of the possibility of tartar deposits upon tooth roots from the blood plasma. These two classes of tartar formations are so distinct in character, mode of origin and in their effects as to require separate study.

Salivary Tartar.—Considering then salivary tartar as a distinct class of formation, the first postulate regarding it to which I wish to call attention is that it is a disease phenomenon not only as regards its effects, but especially as regards its production. That salivary deposits may appear upon the teeth with no tangible evidences of ill health discernible, either by the patient or by the expert specialist, I freely admit, yet on the other hand it must be conceded that in typically healthy mouths tartar does not form; therefore, the persistent presence of tartar is prima facie evidence of some aberration, be it ever so slight, from the ideally normal balance of nutrition.

It has long been known that saliva as it issues from the glandular ducts into the oral cavity contains in solution a considerable amount of carbon dioxid, and that filtered saliva becomes turbid after standing owing to the escape of this dissolved carbon dioxid; and that this loss of carbon dioxid is accompanied by the

precipitation of salts of lime, mainly its carbonate and phosphate. From these observed facts has originated the theory that tartar deposits are caused by the continual escape of carbon dioxid from the saliva and the precipitation of the basic carbonate and phosphate of lime upon the teeth. Examinations of tartar show it to be of irregular chemical composition, no two analyses being strictly alike, yet the two salts of calcium already referred to constitute its chief constituents with occasionally the presence of the corresponding magnesium salts or the ammonia-magnesium phosphate known as triple phosphate. Various other substances have also been found in tartar, e. g., the uric acid salts of sodium and calcium, lactates of calcium, organic matter, debris of food, bacterial elements, etc. These latter are, however, of minor importance for the reason that they constitute but an insignificant proportion of the deposit.

The theory which bases tartar formation upon the precipitation of lime salts from solution in the saliva through the escape of dissolved carbon dioxid appears to be well and scientifically founded, not only because the fact of precipitation of lime salts from the saliva has been experimentally demonstrated to follow escape or expulsion of carbon dioxid from the fluid, but because later studies of the part played by carbon dioxid as a waste product of metabolism furnish additional and corroborative evidence of the soundness of the theory in question.

The solvent power of carbon dioxid for calcium carbonate is well known, the most striking and familiar example of it in nature being that concerned in the formation of stalactites and incrustations in caves and around mineral springs by water charged with carbon dioxid and holding calcium carbonate in solution. The solubility of calcium carbonate in water containing carbon dioxid is due to the fact that the carbon dioxid acts upon the basic calcium carbonate which is soluble, but as this latter compound is one which readily decomposes with liberation of carbonic acid the basic or insoluble carbonate is at once precipitated as soon as the carbonic acid escapes.

It has long been known that carbonic acid had the power to dissolve calcium phosphate. Attention is called to the fact by a paragraph quoted from Mr. W. H. Pepys, Jr., the eminent English chemist, in the first edition of *Fox's Natural History of the*

Human Teeth, published in 1803. He states that "phosphate of lime mechanically suspended in water is speedily and completely dissolved by passing a copious stream of carbonic acid gas through it." Recent studies of this phenomenon reveal the fact that the action of carbonic acid upon basic calcium phosphate is to convert it into the acid phosphate and acid carbonate of lime, both of which are soluble in water, and that reprecipitation takes place when the carbonic acid is expelled from the solution by boiling.

It seems reasonable then to conclude from the foregoing data that the dissolved carbonic acid of the saliva may be and probably is concerned in holding the earthy carbonates and phosphates in solution and that the subsequent liberation and escape of carbonic acid from the saliva leads to the precipitation of these salts in basic form upon the teeth in the formation of salivary calculus. With this hypothesis as a starting point, the question of carbonic acid formation in the body becomes an important and interesting subject in relation to the formation of tartar. Carbon dioxid, as we know from physiological researches, is one of the important and constant excretory products of cell metabolism and is one of the terminal or end products of carbohydrate oxidation. The oxygen necessary for the carrying on of the process of cell nutrition is carried by the hemaglobin of the arterial blood discs to the tissues, and after performing its office of setting in motion the chemical transmutations collectively described as cell metabolism, is partially excreted in combination with carbon as carbon dioxid, which in a large degree is carried by the venous blood discs back to the lungs and exhaled with the expired breath. Only a portion, however, of the total quantity of carbon dioxid formed as a waste product of metabolism finds its exit from the body by way of the pulmonary outlet. Carbon dioxid is relatively soluble in aqueous solutions and a considerable portion of the metabolic carbon dioxid goes into solution in the blood plasma in which the red discs float. From forty-three to fifty-seven volumes of CO_2 have been found in the blood in combination with soda to form carbonates and bicarbonates. The quantity of dissolved gas and that in combination with alkali bases is variable in different individuals, and is by no means constant in the same individual. I have elsewhere called attention to the important

part which this dissolved carbonic acid in the blood plasma plays in converting the basic phosphates of the blood into acid phosphates and the significance of this function of carbonic acid in producing an excessive elimination of acid phosphates in the urine, the saliva and the secretion of the buccal mucous glands. I wish again to call attention to it here as a probable factor in tartar formation. The acid phosphates of calcium and of sodium are extremely soluble, and as carbonic acid is directly concerned in the formation of these acid phosphates from the less soluble basic phosphates it is evident that where carbonic acid as a product of cell nutrition is formed in excessive amount there must be a corresponding increase in the quantity of soluble acid phosphates formed in the blood plasma.

Tartar a Phenomenon of Nutrition.—As a matter of clinical and laboratory study it has been found that where excessive carbonic production is going on in those individuals who are suffering from that type of malnutrition which is characterized by suboxidation we find the urine and saliva both loaded with phosphates and both markedly acid in reaction. I have not yet studied the question of tartar formation in these cases, so that I am not at present prepared to express an opinion as to what extent, if any, this increased phosphatic elimination may be related to tartar deposits. It has been pretty generally accepted that tartar does not form rapidly in mouths of acid reaction, but more accurate observation is needed before we would be justified in reaching a definite conclusion upon that point, especially as salivas frequently exhibit the amphoteric reaction to litmus, that is, they give both the acid and the alkaline reaction when tested separately with red and with blue litmus paper, so that before reporting the reaction of the saliva in any given case this feature of its not infrequent amphoteric character should be taken into account.

What I desire particularly to call attention to, or rather to lead up to, by bringing out the nutritional aspects of this question, is to emphasize the point that we must, I think, regard salivary tartar formation as a phenomenon of nutrition and of abnormal nutrition at that.

If, as has been here suggested, an abnormal rise in carbonic acid formation, or its deficient excretion, is a principal factor in the elimination of lime salts, during which process the urine and

saliva become supersaturated with these compounds, then it would seem that we are suggestively near not only to an explanation of the cause of excessive tartar formation, but are in a position to definitely relate it to the particular type of malnutrition of which it is the probable indication. That excessive phosphatic elimination is a concomitant of abnormal carbonic acid production has been made out with convincing certainty from chemical examination of the urine of typical patients. Such studies of the saliva of these cases as I have been able to make show that the quantity of lime salts in solution is abnormally large. Not all cases of malnutrition of the suboxidation type, the hyperacid diathesis so-called, exhibit excessive tartar formation; indeed, in the more phenomenal cases the teeth are, generally speaking, free from tartar and the oral secretions are usually acid in reaction. In the less marked cases of those who exhibit this hyperacid diathetic tendency, the oral reaction is neutral or alkaline and tartar may be abundant. The malnutritional state characterized by suboxidation is one which progresses in the intensity of its manifestations as life goes on unless corrective measures are instituted and the clinical phenomena vary in character as the disorder develops; hence we may in the earlier stages find abundance of tartar deposited on the teeth, while later in life little or none will be observed, especially when chemical erosion of the teeth begins to manifest itself.

My purpose in presenting this view of the subject is to direct your attention to what has been a growing conviction with me, viz., that the local disturbance of the integrity of the dental apparatus from accumulations of tartar, while of great importance in itself, is by no means the only significance which these deposits manifest. There are strong grounds for regarding excessive tartar formation as a symptom of constitutional malnutrition, or some error in the nutritional state of the patient which should be corrected, and that certain facts which I have cited in connection with this subject rather indicate the particular type of nutritional error which is back of and responsible for the local condition.

Etiology of Serumal Tartar Formation.—The etiology of the formation of serumal tartar is a more complex subject, the chemical phenomena involved are elaborate in character and time will not permit more than a general reference to it here. I have not

touched upon the important part played by the colloidal substances found in the oral fluids, notably mucin, in tartar formation, also for lack of time. I would direct the attention of those interested in this subject to the able paper by Dr. E. S. Niles of Boston, which appears in the *Dental Cosmos,* Vol. XXIII, p. 169, and to two papers by Dr. H. H. Burchard in the same journal, Vol. XXXVI, p. 1026, and Vol. XL, p. 1, respectively.

My main desire in presenting this very general view of the topic under consideration is to stimulate a study of tartar cases from the constitutional standpoint and to secure from clinical observation reports as to the nutritional status, the food habits, the hygienic conditions and the important factors of bodily exercise and rest that these cases present, so that with these and further scientific laboratory research we may be possibly able to arrive at a more comprehensive understanding of this very common disorder.

Discussion. *Dr. C. O. Kimball,* New York: In studying Dr. Kirk's admirable paper, it has been a matter of great interest to me to note the accuracy with which he has drawn his conclusions, and especially the one that the changes that occur in the physical system are really at the bottom of the formation of tartar. It interested me so much that I made a brief analysis of his paper, which I had intended reading to you, but Dr. Kirk has forestalled that by making the analysis himself. The substance of the whole matter seems to be that the storing up of carbonic acid in the blood brings certain elements into the saliva, among others an excessive quantity of the lime salts, which results in the formation of tartar. As regards the clinical history of the case—for I cannot go into the chemical side of the matter—the first thing we notice in the deposits of tartar is suggested by the place in which we find it. It evidently comes from the saliva. We find it in most marked quantities around the lower teeth and the buccal of the upper teeth, thus proving by its very position that it comes from the salivary glands. There may be rare cases in which no tartar deposits are found, but beyond question tartar conditions exist in the average human being. In the course of a long practice I only recall one patient whom I saw regularly (and in this instance during a period of perhaps twelve years) where tartar did not exist. In all that time I never had occasion to remove

tartar once. We can all recall cases in which the general condition of the health of the patient has been closely associated with the health of the teeth, with the amount of tartar deposited and the general condition of the teeth and gums, and yet, as I have been thinking over the past years and various cases, I am surprised to recall that sometimes the rule has not worked; that soundness of health has gone with a good deal of tartar, and lack of health has been accompanied with a comparative freedom from tartar. It may be that such cases if carefully studied would show conditions of the urine and saliva which did not appear in the outward condition of the patient. I think that the subject brought before us is one that should stimulate interest, care and watchfulness in our daily work, and it is with that hope that I give way for further discussion.

Dr. Wm. Jarvie, Brooklyn, N. Y.: This subject is not only one of great interest, but is also of greater importance than has usually been credited to it. Dr. Kirk started his paper by the remark that a great deal has been written and said as to the origin of the calcareous deposits upon the teeth, and that there is a diversity of opinion as to whether there is such a thing as a serumal calculus.

To my mind, the chief point in Dr. Kirk's paper is his statement that evidence may be found in the mouth as to the general condition of the patient, and I think that the conditions found in the mouth are much more important than they are considered to be by medical men in general. It is undoubtedly a fact that the nature and condition of the saliva varies in the same subject with the varying conditions of his system. I believe the time will yet come when through the mouth we will find indications of constitutional disturbance, and I hope that Dr. Kirk and others who are of a scientific turn of mind will follow up investigations of this sort, and if they do I know it will not only be a great help to us as dentists, but also to those who are practicing medicine. In conclusion, I want to say that I feel that we are fortunate in having men like Dr. Kirk in our profession.

Dr. D. W. Barker, Brooklyn, N. Y.: I would like to have Dr. Kirk tell us, in summing up, whether he has given much attention to the effects of mouth breathing upon tartar deposits. I find that that is a habit with a good many people who are

troubled with a large collection of tartar. It has been my custom to ask patients if they practice breathing through their mouths, and it is surprising to learn how many admit that they are. Many are accustomed to sleep with their mouths open, and that without being aware of the habit. I believe that many mouth breathers are the subjects of large deposits of tartar, and I would like to know if Dr. Kirk has considered the matter and what he thinks of the probable results, pro and con.

Dr. T. Lowe Young, New York: The paper to-night has been of very great interest to me, and a couple of thoughts came into my mind in regard to the deposits we find on the teeth. If these deposits are the result of a diseased condition I think it is without question that they must be due to malnutrition. The question of abundant deposits of tartar in the case of mouth breathers, brought up by Dr. Barker, might be readily explained by the fact that invariably where we have children who have been in the habit of breathing through their mouths for any considerable period of time we have such malocclusion of the teeth that it is absolutely impossible for them to properly masticate their food. I think that there is nothing as good for the gums as thorough mastication of proper food, and lack of mastication has more to do with malnutrition than anything else.

Dr. H. Clay Ferris, New York: I wish to take this opportunity of thanking Dr. Kirk not only for the article that he has presented to us to-night, but also for his previous writings on the subject. They have been of great benefit to me in cases where the doctors returned a negative report in the examination of the urine, as it caused me to send these people to a stomach specialist who would make an examination of the gastric juices, and give me a report, and in almost every instance we would find that a pathological condition existed. By following up that line, putting the patient on a diet, the results were very satisfactory in every case that I have handled. I am very glad of this opportunity to show my appreciation to Dr. Kirk for his contribution to this branch of our science.

Dr. James G. Palmer, New York: I cannot add anything to the subject under discussion except to refer to one or two things that our patients ask us frequently: "Doctor, where does the tartar come from? Why do I have so much tartar on my teeth,

especially as I brush them carefully every day?" Until I listened to Dr. Kirk this evening I have not had a satisfactory answer to give my patients, though I have always had a feeling that it had something to do with the general condition of the system, but I never realized that it was so intimately connected with that condition until now. I shall hope in the near future to hear from the Doctor again on the subject, and to know more about it than I do now.

Dr. Kirk: It is always a very gratifying thing to me to come to Brooklyn, because I invariably meet Dr. Jarvie, and he always lets me down very easily. This evening he has been kind enough to give me the assurance that it was not my anticipated paper, but the holiday and the weather that combined to make the attendance so small. The character of the discussion that we have had on this subject has certainly been complimentary and gratifying to me. The topic of the paper is merely a suggestion that has been in my mind for some time. I hope that I have not conveyed the impression that I have attempted to present an exhaustive article on the subject. The whole question of tartar formation is a very complicated problem. There are a variety of ways in which tartar may be formed. I did not intend to go into all the details of the formation of tartar. It seems pretty evident from what studies have been made of the subject that any condition of the salivary calculus that will cause precipitation of calcium salts will also carry down with it mucous secretions, and thus form tartar.

I think there can be no reasonable doubt that mouth breathing is related to tartar formation at least as a contributory factor. The constant interchange of air currents brought about by mouth breathing necessarily tends to cause evaporation of films of saliva and mucus upon the teeth. This, on the one hand, would result in loss of the dissolved carbon dioxid of the saliva, with consequent precipitation of lime salts in a mucoid medina concentrated by evaporation, or inspissated by the loss of water with the final effect of tartar formation upon the protected tooth surfaces. Proper mastication of food is important as a prophylactic measure against tartar formation, not only in a mechanical way, but from the nutritional standpoint. If we concede the point, as I think we must, that excessive tartar formation is evidence of

some nutritional fault, then imperfect mastication, in so far as it may tend to the production of malnutrition, may also be a predisposing cause of tartar formation. It is principally the nutritional aspect of the question that I have endeavored to bring to your attention this evening. I am extremely desirous of obtaining fuller data on the subject, and I hope that the purpose of the paper may commend itself to your sympathetic consideration, so that you will be willing to make a study of the food habits of those of your patients who exhibit a marked tendency to the excessive formation of tartar. By this line of inquiry we may be able to gather more light upon this unsolved problem of dentistry. —*Items of Interest.*

CONTINUOUS GUM WORK. By A. K. Macdonald, M.A. Cantab. The form of artificial denture known to the profession as continuous gum, consists essentially of a platinum base, to which porcelain teeth have been soldered, the eminences and pockets of the gum, and the rugæ of the palatal vault being supplied by porcelain body, fusing at a lower temperature than was employed in the making of the manufactured teeth above mentioned, over which an enamel, bearing the closest possible resemblance to the natural gum color that can be obtained, is afterward fused.

The first experiments in this truly beautiful and artistic work were made by M. de Chemant, in France in 1815, who obtained a patent for making porcelain of "incorruptible mineral teeth" carrying imitation gums. Unfortunately his pigments were rapidly destroyed by the fluids of the mouth.

Three years later M. Delabarre suggested using individual teeth surrounded by a mineral body, the fusing point of which was lower than that of the teeth. His experiments were fairly successful, but did not attract much attention.

In 1846 a Dr. John Allen of New York compounded a porcelain body, still in use, and which he patented in 1851. His methods of working and formulæ are practically those that we use to-day. He also first pointed out the desirability and facility of restoring the lost contour of the face.

The term "continuous gum" may technically be applied to all

cases in which the artificial gums and teeth are fused together to form one piece, irrespective of the base plate material used, and may be applied to either an upper or lower denture. It is not, however, intended that the scope of this paper, which must necessarily be somewhat restricted, should embrace more of the subject than is involved in the explanation of the processes that are required in the manufacture of a complete upper denture of continuous gum and palate, fused to a platinum base plate.

In this, as in the making of all other dentures, a perfect impression of the mouth is essential, and for this purpose plaster-of-Paris is recommended *par excellence,* except in cases in which *marked* differences in the density of the tissues is apparent, when modeling composition may possibly be employed with better success.

The model having been poured, a careful examination of it should be made with the object of ascertaining the position and possible movements of all ligaments. The base plate for the bite should be trimmed free of any such ligaments, and any doubt as to its being really free should be verified in the surgery, and any further reduction required made there, owing to the fact that when once struck the platinum plate cannot be cut down to suit the mouth as in other processes. The reason for this will appear later on. The bite having been successfully taken, the model should be stearined, dried, etc., and all the usual precautions taken to ensure a successful sand cast. The proper dimensions of the plate having been ascertained as above, they should be marked on the model, and a wall of wax built round this mark to form a right angular ledge for turning a rim to the plate.

If a vacuum chamber is required for adhesion purposes, it should *not* be cut out of the swaged plate, and a chamber piece soldered to the plate, as is commonly done in metal work, because the pure gold necessarily used to solder the relief chamber to the platinum plate would run over the whole plate, under the intense heat subsequently employed to fuse the mineral body, but a piece of Meta metal cut to the desired size and shape, and of about No. 8 to 10 thickness on the English gauge, should be fastened to the model with cement wax before casting in the sand. This plate may be subsequently punched round this, so as to make the edges clear and sharp. In any case, it is always advisable in

an upper denture to insert a relief disc of thin metal, No. 4 or so, in the manner described above, over the region of the Median raphæ of the palate, and over the slight tuberosity commonly met with at the junction of the palatine with the superior maxillary bones, in a position posterior to the center of the roof of the mouth. (Post nasal spine.)

One or more casts may now be taken in sand, and models and counter dies, poured in Babbit metal. If ordinary zinc and lead are used, frequently pickling of the plate in $H.N.O._3$ is necessary, as the slightest speck of the base metals on the platinum will cause perforation under heat. Some hold that if lead and zinc are used the platinum should be protected by wet tissue paper while being struck.

It will have been noticed that platinum alone, of the various metals that can be used as a base in other forms of dentures, has been mentioned as a suitable base for continuous gum. The two most important reasons for this are, in the first place, that it alone of the metals can withstand the heat necessary to fuse the mineral body employed in continuous gum work, and in the second place, that its coefficient of linear expansion is very close to that of the body, thereby insuring evenness with the body in the time of its cooling, thus obviating the cracking of the latter by a faster or slower contraction.

Platinum was discovered in South Africa in 1736, in an unalloyed and unworkable condition. Over 100 years later Dr. Woolaston first purified it by a mixed chemico-mechanical process. It is now, however, mixed with galena, the lead subsequently being driven off by cupellation under the oxyhydrogen flame.

If alloyed with iridium it becomes so strong as to be exceedingly difficult to swage, but it is sometimes used for continuous gum when alloyed in this manner.

All this is, of course, done by the manufacturers, and the purified metal is supplied in sheets like gold. This should be reduced to a No. 4 thickness on the English gauge. A lead foil pattern may now be cut, 1-16 of an inch larger in every way than the actual plate will be required, and the platinum carefully cut to it. The platinum should then be well annealed, which is quite possible with the ordinary foot blow pipe, and, having been cooled, should be roughly kneaded on to the metal model with the

fingers, and then gently tapped up with a cork tipped horn mallet before being swaged between the die and counter, pickling in $H.N.O._3$ between each swaging. The swaging may be done with any of the swagers on the market, or with the sledge and anvil. When this is complete and the plate fits the model, there will, of course, be a flange projecting at right angles all round the edge of the plate to the distance of 1-16 of an inch. This should now be gently turned over toward the plate, to form a complete rim, by means of square-nosed pliers, protected by bicycle valve tubing stretched over their points. Kinking will take place round the sharper curves, and where it does the overlap may be squeezed together.

At this stage the base plate is complete. Continuous gum teeth of the correct shade and size should now be selected. Those supplied by the companies for this purpose have long roots and a single pin at the back. It is quite possible to use ordinary vulcanite platinum pin teeth. If these are used, however, the pins should be bent together until they just touch. The teeth should be mounted in wax in the ordinary way on the platinum plate, and tried in the mouth, any mistakes in articulation remedied there and then and the case returned to the workroom. There all the labial and buccal surface of the wax should be removed from round the necks of the teeth and the case invested in granite sand and plaster-of-Paris, two parts of sand to one part plaster, in the manner shown in the diagram. Granite sand is recommended as an investing material for this class of work, as it rarely cracks under heat, like marble dust and pumice so often do. When thoroughly dry all the wax at the palatal side of the teeth must be boiled off. Platinum pin wire, of the thickness employed for tube teeth pins, must now be cut into sections the correct height for each tooth, and wedged in between the pin or pins under the shoulders of the teeth and the platinum plate.

The older way of fastening the teeth to the plate by bars soldered to two or three teeth at a time, and the bars themselves bent down and soldered to the plate, is not recommended by the writer as being as strong as the post method for each tooth as described above, which is specially adapted to bear the strain of mastication, and which allows a tooth to be brought back into line if necessary. The whole investment must now be heated to a

red heat which can be quite easily done with the blow pipe and foot bellows. Pure gold must now be laid at the points where the pin wire touches the pins of the teeth and the plate, and fused with the flame directed on to the required spot, and reduced to a point. Old discarded gold cylinders do excellently for this purpose. This being completed all round the case, it should be allowed to thoroughly cool, when the investment may be washed off. If by any chance there has been cracking of the investment and the teeth have warped out of line, this can now be remedied by bending their wire supports with pliers, so as to bring them back to their proper articulation with the lower teeth. The teeth being now soldered to the base plate, the second part of the process is complete.

The third and last process may be subdivided into four stages. Fusion of the little pyramids of body round the junction of the pin stays to the plate, the further fusion of a film of body over the whole labial, buccal and palatine surfaces of the plate, and the building up in body of the festoons of the gum and the median raphæ and rugæ of the palate, and finally the running on and fusion of the gum enamel.

First Stage.—Any high-fusing bodies may be used and a grayish color chosen. This should be mixed on a perfectly clean porcelain or glass slab, with a perfectly clean bone spatula, to a creamy consistency, with absolute alcohol. This is applied with a camel's hair pencil round the bottoms of the platinum pins now carrying the teeth, in triangular heaps, having the base toward the plate. This having been done round each and every pin, the piece should be placed half way in an electric furnace, resting at the open gate, with the switch turned on to the first contact. When thoroughly dry, the piece may be put right into the furnace, the gate closed and the lever turned on to the second and third contact studs, raising the heat. Thus the heat is gradually increased until the case is properly fused. The piece should on no account be now withdrawn from the furnace, but the lever should be turned back to the first contact stud and the piece allowed half an hour to cool down to this, when the gate may be opened, the piece partially withdrawn, and the lever quite shut off.

Second Stage.—The second layer, of a slightly lighter shaded body, may now be mixed as before, and applied as a thick film

all over the plate, and carried up round the necks of the teeth. This should be dried and slowly fused exactly as before.

Third Stage.—When this again is thoroughly cool, a third mixing of body may be done, and with this all the festooning and contouring of the gums and the forming of the raphæ, and the rugæ, must be carried out. On this most artistic portion of the whole process depends the success of a denture, whose strongest point in its favor is its marvelous resemblance to the natural appearances of the gums and palate. Up to this the processes involved have required but ordinary mechanical skill and care to bring them to a successful issue, but at this stage those who have the artistic genius at all developed will have an opportunity of exhibiting it in a marked degree. These markings should be a little exaggerated, as the body tends to contract in fusing. The drying and subsequent fusing must now be repeated. During the last five minutes the piece must be most carefully watched through the slot in the furnace gate so that it may not become overfused. It has, of course, to be cooled as carefully and as slowly as before.

Fourth Stage.—Gum enamel, of a color suited to the individual mouth, must now be mixed and painted on to the piece where required with the camel's hair pencil, and the piece put back into the furnace and fused, until a gloss is appreciable all over the surface, when viewed in the shadow cast by a spatula passed over the piece, while still in the furnace. It must be as slowly cooled as before, when it may be removed, and will be found to have that beautiful natural, moist appearance characteristic of this class of work.

In conclusion, a few remarks as to the advantages and otherwise of this form of denture, together with the formulæ of mineral body and of gum enamel, as used above, will not be out of place.

ADVANTAGES.

It is the most cleanly of all dentures.

Its base plate, being of platinum, can never be acted on chemically by the acids of the mouth.

It is free from interstices where food debris may lodge and become offensive.

It can be completely cleaned at any time by simple scrubbing with soap and water.

It is the most lifelike of all dentures, the gum enamel being carried over the palate, tending to lead to the complete deception of anyone save a dentist, and even he would require close inspection to be certain that a denture is being worn.

A broken tooth can be replaced easily by grinding out the piece on the wheel, and fitting a new tooth, as in any other repair. The body must be now built up round the tooth, fused, cooled, etc., as before.

Should the mouth absorb under the plate, the gum over the absorption may be chipped off with a mallet and chisel from the plate and the latter bent up to the new model, new teeth being fused on as above.

DISADVANTAGES.

Difficulties of adhesion owing to the great weight of the denture.

Contraction of the body is said to warp the plate.

Extreme liability to fracture when out of the mouth. They are generally broken by the patient when washing them.

Loud clicking sound on occluding upper and lower dentures.

Difficulty in making the case free from slight superficial cracks like a cobweb over the gum and palate. This can be obviated by great care in slowly heating and cooling during baking.

Formula of Mineral Body for Continuous Gum Work.

Finely powdered feldspar	40 dwts.
Flux	9 "
Kaolin (colored with Titanium)	3 "

Mix and grind dry for half an hour.

Place on fire clay slide, coated with silex finely ground, and bake in furnace to vitrification, cool and grind until it can be passed through a No. 10 bolting cloth sieve.

Formula for Gum Enamel for Continuous Gum Work.

Flux	12 dwts.
Feldspar	40 "
Gum frit (Purple of Cassius)	2 "

Grind for one hour and fuse as above. Cool and grind until powder passes through a No. 10 bolting cloth sieve, when 6 grains

of gum frit are to be added to each ounce of the enamel powder and mixed with a spatula.—*The Dental Record.*

CLEANLINESS. By Dr. J. V. Conzett, Dubuque, Ia. Who shall ascend unto the hill of success? He that hath clean hands and a pure heart.

We all desire to be successful, and it is a laudable ambition, successful not only from a professional, but also from a financial, standpoint, and I think that the title and text of this paper furnishes us with the greatest aid to success that we can have, and conversely the greatest foe to success. In this day of aseptic dentistry, when the very foundation of our professional practice is based on cleanliness, it would seem to be a work of supererogation to speak upon this subject. But when we look into some offices and see the untidiness and dirt, when we behold the person and habits of some men and when we see the manner in which they operate, then we realize that the last word upon the subject is still to be spoken.

This subject naturally divides itself into three parts: First, the man, his character, habits and person; second, the office, in its furnishings and tidiness, and, third, the operations.

The Man.—It is impossible in a paper of this kind to refrain from saying something about the morals of the man, for not only must the hands be clean, but the heart must be pure. I have no desire to preach, and yet I have seen so many young men throw away their opportunities and their lives because they have harbored impure thoughts, which, like hidden fire, have finally burst forth to consume the man and his prospects, that I cannot refrain from saying that, first of all, success rests upon the character of the man. An unclean man may for a time flourish like the green bay tree, but it is only for a time, and in the long run the man of clean character is the man that succeeds. Personal habit counts for very much. We are, in the large majority of instances, catering to the tastes of refined and gentle women, and there is nothing that more quickly drives away a lady than an unclean and unkempt person. In a word, the man must be a gentleman in all that the word implies.

Second, the Office.—Next to the personality of the dentist, his office is a factor in his success or failure, for a man may be ever

so good an operator, yet if his office reeks with dirt and filth, if the carpets and draperies are dusty and dirty, the linen soiled and thrown carelessly about, the spittoon a filthy mass of putrescence, and the whole atmosphere of the office an offense to the nostrils, he will never be a success. Too many such offices exist, and, sad to say, men of ability sometimes occupy them. It is not necessary that the office be elaborately furnished, but all the furnishings should be clean and should be kept clean. I do not think that any dentist should be his own janitor, nor do I think that he should trust that work to a man, for it requires the trained eye of a woman to see the dirt and her deft hand to remove it. It pays many times over to employ a good janitress to go over the office thoroughly at least once a week and then the office girl can keep it in good condition. In this day of flowing water there is little excuse for that old abomination, the spittoon. The fountain spittoons are cheap enough to be within the reach of all, and all who have flowing water should have one, for there is nothing that requires so much attention as the old spittoon, and even then it is an offense to the eye as well as to the nose. One patient told me that she refused to go to the dentist whom her husband wished her to consult, on account of his filthy habits. "The last time I went there," she said, "I sent my husband in advance to tell him that I would not visit his office unless he cleaned his spittoon." So you see that I speak by the card. A good waste-paper basket is a device that should be in every dentist's operating room, for there is nothing that looks more untidy than bits of cotton soaked with saliva and blood, sand-paper disks and strips, pieces of tape and floss silk, soiled napkins, etc., scattered upon the floor. It is just as easy to toss them into the waste-basket and a great deal more cleanly. The linen upon the chair should, of course, be fresh and clean and a clean towel should always be placed about the patient to protect the clothing. One of the things that needs the most careful attention is the saliva ejector. It should be boiled every time it is used, and it is a good scheme to have your assistant place it upon the tubing as the patient takes the chair, that he or she may see that it has just been cleansed and sterilized. It is impossible for me to say much about instrument sterilization, as that would require a paper by itself, except to say that, of course, an instrument

should never be used without being carefully sterilized. In my office I have, just back of me, a compartment into which every instrument I use is placed as soon as I am through with it, and it is not replaced in its position in my cabinet until it has been sharpened and sterilized.

Third, the Operations.—For the purpose of making an examination, the first thing that we use in making an operation is the mouth mirror, and too often it is carried from mouth to mouth with no effort to cleanse it, to say nothing of sterilizing. To show how important it is that even so innocent an instrument as the mirror should be carefully cleansed, I will relate an incident which occurred in my practice. Very recently a young man presented himself to me for treatment, saying that he had had a tooth extracted the day before and that the socket was paining him badly. I examined the socket, found evidences of inflammation and made a palliative treatment, and then he called my attention to an inflammation of the gums about the lower third molar. I placed my glass under the tongue for an instant to moisten it and discovered a syphilitic ulcer upon the gingivæ under the tongue. I immediately withdrew my glass and taxed him with being a syphilitic. He admitted it and I proceeded with my treatment. But if I had not recognized the condition and if I had not been in the habit of sterilizing my mirror, the beautiful girl that took my chair immediately after he departed would have been in grave danger of infection. Unfortunately we do not always recognize these cases, and, worse still, the victim seldom or never tells of his condition, so the only safe plan is always to sterilize.

One of the things that I find neglected by many operators is the proper cleansing of a patient's teeth. They do not do such operations properly because it takes too much time and does not pay. Too many men are in the habit of "throwing in" the cleaning, and the consequence is that it is either not done at all or is done in such a cursory manner that it might just as well be left undone. The first thing to be done when a patient presents for treatment is to make an engagement for a thorough cleaning of the teeth, if it is needed, and charge for it. In those cases I usually make half-hour engagements and charge for the time, if the case is such that three or four treatments are neces-

sary to place the mouth in hygienic condition, and I charge accordingly and find that the patients appreciate the result and gladly pay for it. Of course, I sometimes hear "Oh, my! Dr. Blank only charges $1.00 for cleaning teeth," and I answer,"Yes, but if you want your teeth cleaned as I clean them, you will have to pay for the time that it requires."

I am a thorough believer in the rubber dam. I confess that I use it on almost all occasions. Without it one cannot see so well what he is doing; cannot exclude the saliva and the contained organisms, besides the debris of decay and cut-tooth substance, as well as medicaments and filling material, fall into the mouth to the annoyance and disgust of the patient. In the treatment of teeth it should always be used. I cannot see how a man expects any good results without it. We appreciate the fact that a root canal must not be contaminated by bacteria, if we hope to escape an alveolar abscess, and yet the canals are opened, the saliva allowed to flood them, and we expect that after the treatment with some antiseptic conditions will be all right. I believe thoroughly in antisepsis in its place, but I believe that the best antisepsis is asepsis.

It is a very difficult matter to write a paper upon this subject and not make it too long. So many phases of it present themselves to me, but I must put them aside. Just one word, however, upon the condition of the operating room after a patient leaves it. I believe that the last patient of the day has just as much right to a clean room, linen, instruments, etc., as the first patient, and a patient should not step into your operating room until all evidences of the previous operation have been removed. You say, "I can't do that, I am too busy a man," and I reply that I do not believe that there is a busier man anywhere than I am, and yet my operating room is so arranged that as soon as an instrument or anything else has been used it is put away, either in the compartment reserved for instruments that must be cleaned and sterilized, or in its proper place, as are the filling materials and accessories. There are no strips, disks or dirt on the floor, for they have been thrown into the wastebasket as they have been used, so that all that is required to make the operating room as clean for the last patient as for the first, is fresh linen.—*Dental Review.*

Clinical Digests.

REMOVABLE BACKINGS IN CROWN AND BRIDGE WORK: ANOTHER METHOD. By Samuel H. McAfee, D.D.S., New Orleans, La. The removable backing or detachable facing principle has many points of excellence which are at once recognized and appreciated by the experienced bridge-worker. These points have been expatiated upon at length and are already familiar to those interested in the subject.

Several methods for accomplishing the same general result have been advanced. In the one here briefly described small platinum tubes constitute the basic principle. They are used so as to preserve in proper size and alignment small holes through the body of the crown (or dummy) for the accommodation of the

FIG. 1

pins of the facing—the latter being cemented to place in the finished piece.

Fig. 1 is a mandrel, made of an old instrument, for forming the tubes.

The tubes should be made of about No. 38-gauge platinum, and should be about one-fourth inch long, and slightly larger in caliber than the pins of the facing to be used.

Fig. 2 shows the tube as formed around the mandrel, ready to be joined with platinum solder or pure gold—preferably the former, with the oxyhydrogen blow-pipe.

After the joint is soldered, the surplus is cut off and the joint filed rather smooth. The tube is now pushed down and twisted against the tapering base of the mandrel to give one end a slight flare. (Fig. 3.)

The facing is ground to proper shape as usual. The backing, preferably of about No. 38-gauge platinum, is now roughly adapted in the usual way, and holes are punched through it large enough for the tubes to fit into them snugly.

A tube is placed on each pin of the facing and the backing is carried down over them. The flare on the end of the tubes causes them to tighten in the backing. Backing and tubes are

now removed and joined with a minute quantity of solder—preferably platinum solder. The small surplus of tubes on the facing side having been ground off, the backing is returned and carefully burnished and trimmed. A little manipulation may be necessary to make the backing go on and off the facing easily. Twisting a smooth, tapered instrument in the facing end of the tubes will usually accomplish this.

Hold the backing by one of the tubes with the soldering tweezers, and flow pure gold over the lingual side to reinforce it. The incisal edge of the backing may be left a trifle long to insure sufficient thickness of gold at the incisal or occlusal edge of the facing—the surplus being ground off subsequently.

If the operation be carefully done, no gold will run into the

FIG. 2. FIG. 3.

tubes or on the facing side of the backing, and the latter will go on and off the facing freely.

Fig. 4 shows a reinforced backing. The tubes are purposely left long, so that their ends stand up above the level of the solder in the final soldering.

The gold occlusal surfaces of posterior crowns or dummies are formed in any of the ordinary ways, and the parts are assembled on the cast with wax. Care must be taken that no wax flows into the tubes or between the backing and facing, otherwise it will be difficult to remove the facings prior to the final investment.

I prefer to make the articulating cast of plaster, and to transfer the assembled piece from this cast to a final investment composed of two parts "Sump" or "Champion" compound and one part sand. Removal of even extensive pieces from the plaster cast may be safely accomplished if the abutment pieces are loosened on the cast prior to final assembling. This is facilitated by flowing a little wax in the copings and on the posts prior to filling the impression.

When the parts are all waxed for investment, lay a piece of broken match along the lingual aspect and join it rigidly with Crown sticky-wax—stiffening the piece so that it may be safely

removed and invested. An investment so made is less liable to crack or warp in the fire.

Just prior to the final investment the facings are of course removed, and the facing side of the backings is coated with chalk-alcohol paste; this is worked into the tubes to prevent the solder from flowing in undesirable places.

If platinum, platinum solder, and pure gold are used in the initial steps, the body of the piece may be safely made with 22-k. solder. There being no oxidation of the platinum parts and no danger of melting them, a minimum of borax may be used, and sufficient heat applied to thoroughly fuse the high-grade solder and insure its flowing into the interstices, leaving few, if any, borax pits.

After the final soldering is completed, the piece may be cooled

FIG. 4. FIG. 5. FIG. 6.

off at once by dropping it in water. The surplus tube-ends are now ground off and the piece roughly finished and pickled. The inside of the tubes (now simply holes) should be roughened with a bur. The facings should be cleansed, their lingual sides etched with hydrofluoric acid and again cleansed, a brush being used to remove the film of dissolved porcelain. The pins may be "nicked," or threaded with a Bryant bridge-repair screw-cutter, No. 1 (see Fig. 5), and the facings carefully cemented to place. After the cement has thoroughly set, the lingual openings of the tubes or holes are closed with cohesive gold, and the piece is given its final finish.

Fig. 6 shows a complete crown ready for the cementing of the facing.

In cases in which the gold backing must necessarily be thin, the Shriver method may be used to advantage, though in nearly every instance there will be sufficient depth of the holes to insure strong anchorage if the precautions be taken in the beginning to incline the pins so that they will pass through what will subsequently be the thickest portion of the body of the crown or dummy.

While 22-k. gold plate, 22-k., 20-k. and 18-k. solder, and the ordinary blow-pipe may be used in this method, much finer work can be done with platinum, platinum solder, pure gold and 22-k. solder, using the oxyhydrogen blow-pipe. I consider it indispensable in high-class crown and bridge work. The beauty and fineness of a crown or bridge in which nothing below 22-k. solder is used, and the ease with which the work may be done with the oxyhydrogen blow-pipe makes its use well worth while.

No claim is made for originality of the general principles involved in this method, the tube feature being probably the only element of novelty in it.—*Dental Cosmos.*

A SUCCESSFUL METHOD OF CONSTRUCTING LOWER DENTURES FOR FLAT MOUTHS. By J. W. Combs, D.D.S., New Braunfels, Texas. I wish to state as a preliminary that I do not lay claim to any originality for the ideas expressed in my paper or for models shown you, but I beg to assure you that I have realized some very gratifying results in employing these methods in constructing lower dentures where there has been an entire absorption of the alveolar ridge.

We are all supposed to know the value of a correct articulation in prosthodontia. There are two fundamental relations of the jaws and teeth, and that is occlusion and articulation. Occlusion is what is wanted when the bite is taken, and is of itself but one movement, the up and down. Articulation contemplates not only occlusion, but all the movements of which the jaws are capable. It must be conceded that in constructing a lower plate perfect adaption of the base to the alveolar ridge is as important as would be the case were capillary attraction depended upon to hold it in place, and, this being accomplished, we look for something to sustain the plate in position. I propose to show you Dr. Carroll's retainer which has so successfully aided in this respect.

The retainers do what their name implies, they hold the lower plate firmly and steadily in position. The muscles of the jaw and cheek in their contraction exert a pressure on the expanded and vertically extending portions of the retainers. This pressure which is exerted without conscious effort is the force that holds the lower denture firmly in position on the alveolar ridge.

The models which I have here will give you an idea of the

position that the retainer should occupy on the plate. They should be so placed that when the teeth are brought together they will not strike the upper gum. If an upper denture be worn the plate at those points nearest approached by the retainers should not be left unnecessarily thick. When the teeth are brought together there should be a space at least one-eighth of an inch between the retainers and the last molars on the upper plate. The ordinary lateral movements of the jaw should not bring the retainers in contact with the upper plate. When the upper wisdom teeth remain they should be so placed that when the mouth is closed their vertically extending portions will occupy position just back of the teeth and be situated about midway between the teeth and the rami of the jaw. Be careful to position them so that the muscular pressure will not be so great as to cause discomfort or irritation. A good rule is to have the vertically extending portion precisely over the center of the inferior alveolar ridge, viewed perpendicularly their upper edges should appear exactly on a line with the inferior alveolar arch. In some cases where the arch is somewhat contracted it is better for the vertically extending portions to occupy a more outward position in order to obtain the required muscular pressure, and vice versa.

It is necessary to bend and adapt the retainers to the requirements of each particular case.

There are two other potent aids in the construction of lower dentures I would suggest, as the second model will show, without the use of the retainers, that is by the shaping of the lingual and buccal sides; carry the posterior lingual wings well downward with a marked concavity in these wings that the tongue may aid by lying in these grooves. To the buccal or outer lower edge the addition of a rim affords another aid; make your plate as before adding the rim to the lower edge of the outer gum, the width of the rim depending on the mouth of the patient; if the lips are thin make it quite narrow in front, about one-sixteenth of an inch, if fleshy or thick may be about one-eighth or more, gradually increasing the width to the side. Care should be taken not to make the rim too low in front. The advantages of the rim are these: First, the rim secures a suction around the entire circuit of the plate, it gives a wide base for a bearing instead

of confining the pressure to the narrow rim of the ridge. Second, it prevents the backward tipping of the plate, as the pressure is well inside the base, the rim supplying a foundation at the point of bearing, and a suction at the opposite side of the plate. Third, it secures a down pressure, the upper edge of the lip and inside of the cheek naturally draw in and down, thus a roll of tissue overlaps the rim the entire circuit, holding the plate in place. After a few weeks' wear a groove is formed in this cheek tissue into which the rim fits snugly, the muscles here relax and shape themselves around the rim which they assist in holding in place. This rim also gives the cheeks a chance to assist by unconscious exertion. The cheek bearing against the gum on one side is counteracted by the pressure of the cheek on the opposite side, the rim touches the inside of the lip and cheek evenly at all points, which gives a sense of security.—*Texas Dental Journal.*

THE ADVANTAGES OF ALL-CARVED BANDLESS CROWN IN A SHORT BITE. By T. H. McClure, D.D.S., Chicago. In the general construction of such a crown as the title of this paper indicates, I have very little which is new to offer. I wish to speak more at length on the details and mainly of bicuspids.

One of the advantages is gained in the first step of the operation, the root preparation. I shape the end of the root very convex, so as to have the greatest possible thickness of porcelain in the finished crown. This is best accomplished with a knife-edged carborundum stone, which is slightly worn. The margins need be very little under the gum, thereby causing no disturbance of the gingivi. If you study this preparation closely you will find the crown supported in such a way that a fracture of the root is hardly possible.

The next step is the fitting of the posts. I say posts, because it is very necessary to have more than one post. The shape of a bicuspid root will always permit of two, even though one is merely a stub. I enlarge the canals with round burs, beginning with very small and gradually using larger until the desired size is obtained. In this way there is little danger of puncturing the walls.

The posts should be shaped so as to extend into each cusp of the finished crown. In this way advantage is taken of the extra thickness in those parts and the porcelain is weakened the least by such an arrangement.

In selecting material for the posts 18-gauge iridio-platinum is heavy enough; smaller would do if the case in hand called for it. A rocking movement is impossible with the two attachments, so that heavy posts are of no advantage, the object being to have the least possible amount of metal in the porcelain.

For the plate over the end of the root I use 36-gauge platinum, fitting directly on the root. A smooth-faced plugger-point with a notch through the center will be a great help in swaging, using the notched part for the margins. This part of the operation must be done with just as much care as in preparing a matrix for an inlay.

I cut a piece of platinum plate a little larger than the root, and, after annealing thoroughly, place it over the end of the root, and burnish the center sufficient to give some indication of the location of the canals. Then I take a sharp-pointed instrument, and while the plate is still in place on the root punch holes for the posts. A broken excavator tapered to a point is good for this purpose, gauging the size of hole by the depth of the insertion.

Next I force the posts to place, fasten the plate with hard wax and remove. I invest in investing material and, in order to save time, mix very stiff and place over a Bunsen flame at once. In this way the soldering can be done in about five minutes. I now replace on the root and finish fitting; next I take a plaster impression and wax bite. Before pouring I flow wax over the posts so that they can be withdrawn from the model. After mounting on articulator, the case is ready for the porcelain.

Mixing the porcelain with a saturated solution of gum tragacanth stiffens the mass and makes it less liable to fracture in carving. I build up about two-thirds with a yellow foundation body, depending upon this to produce the shading at the neck, the degree to be gauged by the angle of the sides. If the case requires little or no shading at the neck, I make the sides quite slanting, forming almost a cone, so that the enamel body, when

applied, will almost or entirely conceal the shade of the foundation body.

If the case requires a marked shading at the neck I make the sides almost at a right angle, allowing for a very little covering of enamel body. You will find, by this method, a beautiful shading out can be produced, starting with a very thin coating of enamel body at the neck and gradually thickening as you approach the cusps.

After baking this section I add the enamel body, making the mass a little larger than the finished piece requires to allow for shrinkage.

Another great advantage in this style of crown is the ease with which a little can be taken off here or added there, so that the buckling up to the adjoining teeth can be made absolutely perfect. To produce such results it is almost always necessary to make some changes during the final fitting in the mouth. After the final baking I peel off the platinum plate so that, when the crown is cemented in place, the joint is as perfect and as sightly as that of an inlay. It is really carrying out the inlay principle in crown work.

With practice and care in each step of the operation you have in the finished piece a near approach to an ideal crown and a step toward a higher art in dentistry. Someone asks, "Why go to so much trouble, when crowns can be had at the supply houses?" Why have a tailor make your spring suit? Suits can be had on the bargain counter. If the bargain counter suit is a disappointment, it is cast aside at the end of the season and forgotten. The unsightly crown is with you always, and a disappointment forever.—*The Bur.*

FORMALDEHYDE.—Polymerized formaldehyde—formaldehyde in a solid form—has all the qualifications necessary to a perfect dental antiseptic. It is most penetrating; it is soluble in water; it does not produce a coagulum; when properly applied its toxic or escharotic effect is nil, and pain seldom or never follows its application unless it be in dead teeth, in which the simple act of opening seems to arouse all the latent forces around the apical portion of the tooth. But the pain and soreness following its application invariably subside within a few hours, when the tooth is ready for permanent filling.—L. B. LAWRENCE, *Dental Cosmos.*

The Dental Digest.

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Where All Communications Should be Addressed.

Editorial.

WHEREIN OCCUR OUR GREATEST MISTAKES.

Careful observation of the acts of individuals, generally, wherein mistakes occur discloses that such may be traced very largely to a lack of thoughtfulness, whereby we mean that the mistakes usually would not have been made had the performer paused and thought out what the results would be. This is particularly true in the practice of dentistry, and the lack of this thoughtfulness on the part of practitioners is a more serious matter than in most occupations, for the reason that in the ordinary vocations of life if a mistake is made the rectifying of it is not so serious a matter as in cases of operations on the human teeth. For instance, suppose a child is placed in the hands of a practitioner for his skill and care, and he observes that the teeth are going to be very much crowded before they have all erupted; without considering what the results must be, he extracts, say, the bicuspid to make room for the cuspid, or extracts the permanent molar for similar reason, or, what is even worse, extracts the lateral incisor because there seems to be no room for it in the arch. These are mistakes that when made can never be remedied. They are injuries which can never be repaired. These are mistakes that are often made from time to time, when, if the operator had stopped and studied and reasoned out from his own knowledge, or the knowledge of others, he would soon have recognized that the intended procedure was altogether wrong and that no benefit could accrue from such extraction.

The same criticism holds true in the ordinary instruction of children in regard to cleanliness; merely telling them in an indifferent way to brush their teeth more thoroughly is not sufficient.

A little reflection would prove to the dentist that so soon as the child reached home he would probably forget the admonition, and the evil consequences of not taking care of the teeth would proceed. Instead of this, if the practitioner were earnest and thoughtful he would have the child come with the brush and illustrate the correct method and repeat such instruction time after time until he was thoroughly imbued with the idea. This result would soon be attained if the instruction were of a kind that would impress upon the child what the results would be if the teeth were not kept clean, or, vice versa, the benefits derived from absolute cleanliness. Such instruction should not be confined to children, but should extend to every patient and the degree of earnestness displayed would add to the influence, as also to the clientele, of the practitioner.

The same is true with almost all the duties of the dentist; he must stop and think and reason out each operation; how it may best be performed and what his duties are in connection with same. It is not our object to enumerate each operation and each duty of the dentist, but more particularly to impress on the minds of our readers the importance of a broader line of thought and reasoning than prevails generally with the dental profession in everyday life.

And why this lack of thoroughness, which is to a great extent lack of thoughtfulness, on the part of practitioners? More than one reason might be given. The first one would be that the practitioner has undertaken a profession and occupation without realizing the importance or the need of thoroughness, and goes through life without any real knowledge of his lack. The second might be attributed to dishonesty, for, as we contend, to perform operations indifferently and in an inferior manner is more than ordinary neglect, and therefore comes under the head of dishonesty, for patients are at the mercy of the operator, not knowing what should be done or whether the work is being performed properly or not. Finally, the lack of judgment might be mentioned, but this, to a very considerable extent, is due to a lack of study and thoughtfulness, and on the whole may be attributed to this one proposition in its full scope—lack of study.

To sum up this entire matter, we find ourselves asking—what is the remedy for this evil? More study on the part of dentists, and

this especially in their early life; study whereby the brain power is increased in this direction. In our next issue we will in greater detail try to show the defects in our educational system in so far as the practicing of dentistry is concerned.

Notices.

SOUTHERN NEBRASKA DENTAL SOCIETY.

The first meeting of the Southern Nebraska Dental Society was held in Red Cloud, Neb., August 30, 1906. The following officers were elected: President, Frank Nelson, Superior; Vice-President, J. W. Prime, Oxford; Treasurer and Secretary, W. A. McHenry, Nelson. The next meeting will be held at Superior, Neb., November 14, 1906.

W. A. McHENRY, Secretary.

HARVARD DENTAL ALUMNI ASSOCIATION.

At the thirty-fifth annual meeting of the Harvard Dental Alumni Association held in Boston, Mass., June 25, 1906, the following officers were elected for the ensuing year: President, Arthur W. Eldred, '90, Worcester, Mass.; Vice-President, Harvey W. Hardy, '96, Boston, Mass.; Secretary, Waldo E. Boardman, '86, Boston, Mass.; Treasurer, Harold De W Cross, '96, Nashua, N. H.; Executive Committee: Waldo E. Boardman, '86, Boston, Mass., chairman ex-officio (one year); Arthur A. Libby, '99, Boston, Mass. (two years); William W. Marvel, '00, Fall River, Mass. (three years). The Council is composed of the above named officers. Trustees to Life Membership Fund: Harold De W. Cross, '96, Nashua, N. H., ex-officio (one year); Frederick Bradley, '86, Newport, R. I. (two years); Joseph T. Paul, '91, Boston, Mass. (three years).

WALDO E. BOARDMAN, '86, Secretary.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A meeting of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, Mass., October 24, 25, 26, 1906.

All applications, together with the fee of $20, if first examination, must be filed with the Secretary of the Board on or before October 20, as no application for this meeting will be received after that date.

Every candidate for examination must be twenty-one years of age.

Application blanks may be obtained from the Secretary.

Temporary licenses are never granted.

The fee for third and subsequent examinations is $5.00.

G. E. MITCHELL, D. D. S., Secretary,
25 Merrimack St., Haverhill, Mass.

RECENT PATENTS OF INTEREST TO DENTISTS.

824,087. Tooth brush, Solon E. Babcock, Plateau City, Colo.
824,096. Dental articulator, Walter W. Crate, Camden, N. J.
824,111. Making teeth, Harry A. Gollobin, Newark, N. J.
824,218. Making dental devices, Stanley Towle, Fall River, Mass.
824,465. Metallic support for artificial teeth, David N. Booth, New York.
825,628. Antiseptic and perfumed block for dental stoppings and other similar purposes, Lucien Eilertsen, Paris, France.
825,271. Right-angle bur-mandrel, George N. Guthrie, Jr., Cookeville, Tenn.
825,356. Artificial tooth for crowns and bridges, Wm. B. Short, New York.
825,578. Tooth-shade guide, Arthur W. Browne, Princes Bay, N. Y.
825,891. Dental engine, Arthur W. Browne, Princes Bay, N. Y.
825,896. Dental measuring tool, Francis X. Dusseau and B. F. Kirk, Detroit, Michigan.
825,901. Vulcanizer, Edmund D. Gilbert, Philadelphia, Pa.
825,940. Crown-tooth attachment, Henry H. Schuhman, Hartford, Wis.

News Summary.

CHARLES WALKER, 56 years old, a dentist of Los Angeles, died Aug. 7, 1906.

HARRY A. GERNERT, 65 years old, a dentist of Bath, Pa., died of diabetes, Aug. 26, 1906.

T. J. CREEDEN, 26 years old, a dentist of Harvard, Ill., died of peritonitis, Aug. 21, 1906.

MATHEW J. PATTON, 58 years old, formerly a dentist of Portland and Astoria, died at Astoria, Ore., of heart disease, Aug. 28, 1906.

MAURICE E. LEYDEN, a dentist of Rochester, N. Y., died Aug. 15, 1906. The deceased was one of the charter members of the Rochester Dental Society.

DR. WILLIAM KAY, aged 34 years, a dentist of Philadelphia, died July 23, 1906. He was born and raised at Dumfries, Scotland, and came to this country in 1892, after which he was graduated from the Philadelphia Dental College, at which institution he later became demonstrator in both operative dentistry and crown and bridge work.

FIRES.—A. J. Hager, Hartsville, Tenn., Aug. 25; loss $2,200, total insurance, $1,400.

ACCIDENTS.—E. D. Geiger, a dentist of Chenoa, Ill., has been incapacitated from his professional duties owing to injuries received through his vulcanizer exploding, Aug. 12.—During the middle of August two men of Tivoli, Pa., were engaged in extracting the teeth of a rattlesnake, when one was severely bitten, but it is not believed with fatal results.

Knowledge is gained by three methods: By reflection, which is the noblest; by imitation, which is the easiest, and by experience, which is the bitterest.—CONFUCIUS.

IT GENERALLY CURES.—Jones—What's good for the toothache?

Smith—Walk about halfway to the nearest dentist's.

SPRAY THE GUM.—Did you ever spray ethyl chlorid on the gums around the root of a tooth that you were preparing for a crown? Try it and your patient will repay you for your trouble.—*American.*

VICE VERSA.—The old theory that a bad stomach affects the teeth is rapidly giving place to the new theory that a bad stomach instead of causing bad teeth is caused by bad teeth.—*Dental Era.*

HEMORRHAGE AFTER TOOTH EXTRACTION.—If the hemorrhage is from the socket of a single-rooted tooth, the return of the tooth, coated with warm beeswax, makes a very good obstruction to prevent the flow of blood.—E. M. FISHER, *Dental Summary.*

DIVORCES.—The wife of Franklin A. Fry, a dentist of Chicago, Ill., appealed for separate maintenance on the grounds of cruelty, Aug. 31.—The wife of Simon C. Hornef, a dentist of Oakland, Cal., filed suit for divorce Aug. 28, alleging extreme cruelty.

ORAL HYGIENE.—Phenol sodique, prescribed as a daily mouth wash, using a few drops upon the tooth brush, prevents caries of the teeth and insures aseptic cleanliness of the buccal cavity. It keeps the mouth in a normal, healthy, alkaline condition.—*The Dental Era.*

TO COLOR PLASTER TO FACILITATE SEPARATION.—Someone has suggested using a little bluing in the water for mixing the plaster for running the case, in order to facilitate the separation. This is an excellent idea, and should be used by all who have not tried it.—*Dental Hints.*

FATALITIES.—Aug. 25 a married woman of Philadelphia, Pa., sought to relieve herself of the pain which followed the extraction of three teeth by inhaling domestic gas, with fatal result.—Aug. 26 a young man of Glenwood, Wis., died in a dentist's chair while under chloroform.

CASE OF FORESIGHT.—"I have a premonition!" hoarsely whispered she, pulling out her first gray hair.

"Premonition of what?" growled her husband.

"A premonition that I shall dye to-night."

USE OF "TALC" SUPPORTS.—"Talc," the commercial form of boilermakers' crayon, obtainable in heavy hardware stores, is useful as supports for porcelain work in the furnace. It may be carved to any form desired and withstands heat perfectly.—GOODMAN A. MILLER, D. D. S., Chicago, *The Bur.*

MERCURY TANNATE.—If the stomach can stand no other form of mercury, try the mercury tannate. Give it in pills or granules one-sixth to one-half grain, three to six times a day. It is one of the least irritating compounds of mercury.—W. J. ROBINSON, *American Journal of Clinical Medicine.*

THYMOL IN THE TREATMENT OF ABSCESSES.—Thymol is very insoluble under ordinary circumstances, but it dissolves in oil of eucalyptus, when it becomes a valuable agent in the treatment, especially of the mild forms of chronic blind abscesses.—GEO. W. COOK, *Western Dental Journal.*

ADRENALIN-CHLORID.—The application of adrenalin-chlorid to freshly exposed or healthy pulps is a decided success, but I have found from unpleasant experience that its application must be confined to such cases. The slightest pathological change in the pulp tissues seriously interferes with its successful use.—I. N. TAYLOR, *British Dental Journal.*

DRYING ROOT-CANALS.—Three or four broaches wound with cotton and passed quickly through the flame of an alcohol lamp, which makes them perfectly aseptic, will, used in turn, dry the canal as dry as can be done by any other method; at least my experience of five years' close watching stands for it.—T. E. BARKER, *Dental Hints.*

A LAWFUL SUBJECT.—

An aching tooth "disturbed his peace;"
Said he, "Egad! forsooth,
I'll go swear out a warrant
And the cops will 'pull' the tooth." —*Exchange.*

SETTING CROWN WITH GUTTAPERCHA.—From a big lump of guttapercha I file it off in powder, and with a small amount of oil of cajuput soften it up on a warm slab. As to the degree of heat, if I can hold it in my fingers the patient should be able to bear it. I use the red base plate, putting nothing with it, but using it just as it comes, making it up into a big lump.—HARRY F. HAMILTON, *International Dental Journal.*

COMPRESSED AIR.—The thing that appeals to the public more than anything else is how easy we can make the work for them. Compressed air does this very thing. It has a tendency to make operations easy, both for the patient and for ourselves. We all want appreciative patients, and we want to get the reputation of trying to do away with pain as much as possible.—DR. LŒFFLER, *Dental Register.*

KEEP THE CAVITY DRY.—Dentin, when dry, is a non-conductor, but when moist, as in a vital tooth, it is a conductor. We are, therefore, always warranted to insure a successful operation in applying the rubber dam or using cotton rolls to keep the cavity dry. When this is done a toilet of the cavity should be made with absolute alcohol, thus eradicating remaining particles of debris, saliva, etc.—BURTON LEE THORPE, *L'Odonto-Stomatologia.*

THREE RULES FOR ARTICULATION.—Three rules cover essentially the ground. Never allow pressure on the six anterior teeth; never, in full upper plates, allow the pressure to be greater on one side than the other; never allow a second or third lower molar which has projected forward so that its face shows to meet an artificial tooth at that angle, as it will surely crowd forward the upper plate, the same as the meeting of the anterior teeth.—*Australian.*

SEPARATING MEDIUM.—A good separating medium is made by dissolving paraffin in gasoline. Put in all the gasoline will take up. Spread lightly over impression with camel-hair brush.—*Dental Hints.*

MEAN MAN.—Dentist (engaging boy)—You seem to be a likely looking boy. How are your teeth?

Boy—Fine. You kin look for yerself.

Dentist—Then you won't do. I want a boy who will take part of his wages in dental work.

CARE IN SETTING CROWNS.—I believe if all excess of cement is not carefully removed it means a loosening, and eventually the loss of the tooth. Therefore, the picking out of the cement after setting crowns is, I believe, one of the most important prophylactic measures for the preservation of crowned teeth.—C. L. HUNGERFORD, *Western Dental Journal.*

REMOVAL OF CALCULUS.—After all the granules have been loosened they must be washed out of the pockets. In very deep-seated pockets it is very often advisable to cut through the gum as near as possible to the bottom of the pocket, then introduce the point of a syringe beneath the gum and force through peroxid of hydrogen, a solution of boracic acid, or hydronaphtol. It is absolutely essential to remove every bit of the deposit at one sitting and get it washed out.—A. E. SHAVER, *Dominion Dental Journal.*

STERILIZING THE HANDPIECE.—The mechanism of the handpiece will rust from boiling because many of its parts cannot rapidly evaporate moisture while hot, on account of their construction. Gasoline, however, is friendly to the mechanism, the sheath being removed. After such a bath it will run easier than ever by being fed with a few drops of oil. A frequent treatment of this kind will keep a handpiece in beautiful condition. Brush the outside of the sheath with a 10 per cent solution of formaldehyde.—J. J. SARRAZIN, *American Dental Journal.*

MARRIAGES.—R. E. Frech, a dentist of St. Charles, Ia., was married to Miss Emma Fischer of Des Moines, Ia., Aug. 28.—O. C Heine, a dentist of Chicago, Ill., was married to a young lady of Guttenberg, Ia., during August.—John Horton, a dentist of Weldon, Ia., was married to Miss Myrtle Eliza Willis of Pleasanton, Ia., Aug. 7.—Frederick R. Solmes, a dentist of Peshtigo, Wis., was married to Miss Elsie Heule of Duluth, Minn., Aug. 28.—T. P. Wagoner, a dentist of Knightstown, Ind., was married to Miss Eva Breckenridge of St. Joseph, Mich., Aug. 15.

DIAGNOSING FRACTURE OF THE INFERIOR MAXILLARY BONE.—Most fractures occur in the body of the bone in the region of the mental foramen, and less frequently as we proceed in either direction from this foramen, being rare at the symphysis. In addition to the symptoms present in fractures of other bones, there will generally be one or more loose teeth at the line of fracture and the patient will complain of inability to properly close the mouth or to masticate food. It frequently happens that the patient comes for treatment or removal of the loose teeth without knowing that the bone has been fractured.—ARTHUR D. BLACK, Chicago, *Review.*

THE RUBBER DAM.—Where conditions preclude the use of a dam, compressed air becomes invaluable. Use a current of air as warm and as strong as the patient can bear comfortably, and in a few minutes you have not only made the tooth and surrounding tissues absolutely dry, but you have also practically anesthetized them by dehydration.—GEO. ZEDERBAUM, *Dental Register.*

POLITE.—As a truly polite nation the French undoubtedly lead the world. The other day a famous Paris dentist's servant opened the door to a woebegone patient.

"And who, m'sieu," he queried, with tender regard, "shall I have the misery of announcing?"—*Pearson's.*

PORCELAIN BRIDGEWORK.—Pure gold, as a solder, is inadequate to the combined requirements of porcelain bridgework when any of the higher fusing bodies are used. Adequate strength is insured by employing 25 per cent. platinum solder throughout the construction of the substructure and including the attachment of the facings, and its use is now universally recommended.—H. J. GOSLEE, *Items of Interest.*

MOUTH BREATHING.—In the treatment of irregularities of the teeth the mechanical work of correcting the deformity has been often carried out only to find it all "go back," simply because the operative cause was not taken into account. In the case of adenoids, if they are thoroughly removed by a rhinologist, nature will work wonders in developing the arch. But the work is not complete unless the patient can close the lips naturally, and this they cannot do in a large percentage of cases unless occlusion of the teeth has been established.—D. W. FLINT, *Dental Summary.*

LIQUID FLUX.—The best liquid flux that I have ever used, and which I compound myself, and find ever ready and faithful is:

℞—Boracic acid

Borax aa	℥ ss
Ammonia muriate	grs. xii
Pot. carb.	grs. v
Aqua. dist. q. s.	℥ iv

It will keep indefinitely and can be used on any metal for hard soldering.—H. E. DAVIS, *Dental Review.*

ALVEOLAR ABSCESSES.—As a rule the most severe characters of the alveolar abscess, properly and promptly treated, abate quickly. On the other hand, if the treatment is delayed, grave results are to be expected. Bone with its Haversian canals blocked by inflammatory deposits, and deprived of its periosteal nutrition, cannot be expected to retain its vitality many days. The area of bone worst situated as regards nutritive processes will die, and then the slow process of exfoliation must be awaited. During this time suppuration in a less violent form will proceed, maintaining continuous free drainage and exposing the case to the continued danger of infection in more virulent form.—G. V. BLACK, *Northwestern Dental Journal.*

ILLEGAL PRACTITIONERS.—Aug. 22 a dentist of Boston, Mass., was fined $50 on three counts for permitting a woman to practice dentistry in his office, she not possessing a license. He appealed.—Aug. 28 a man was arrested at Los Angeles, Cal., for practicing dentistry without a license. He was released on $100 bail.—Aug. 30 at Tiffin, O., a former minister of the Reformed Church was arrested for illegally practicing dentistry in 1905.

TO SET AN INLAY.—A hydraulic cement should be used, as it conduces much to the comfort of both patient and operator, the saliva being permitted to reach the case within two or three minutes, thus obviating the necessity of covering with varnish, etc. The excess cement should be permitted to remain until quite hard, when it can be removed and the operation finished.—GEORGE T. BANZET, Chicago, *Review.*

CAVITY LINING.—When fillings of gold and alloy approximate in adjoining cavities in vital teeth a galvanic current is often produced, causing continual irritation. This electrolytic action may be greatly modified by varnishing the cavities just prior to inserting the filling material. Absolute dryness of the cavity is essential, that the lining material may form a close union with the cavity wall.—BURTON LEE THORPE, *L'Odonto-Stomatologia.*

GOLD FILLINGS: ONE CAUSE OF FAILURE.—I am of the opinion that failure is frequently due to the patient having closed the mouth during the placing of the gold, thus contaminating it either with dust that may have been on the dam or with moisture left by our fingers. Don't allow the gold to touch the dam. A clamp placed on a bicuspid or molar will materially assist in expediting operations upon the incisors and cuspids. The lips are held out of the way, the mouth is kept open, and many petty annoyances completely done away with.—E. K. WEDELSTAEDT, *The Dentist's Magazine.*

BURNISHING MATRICES FOR INLAYS.—I wish to abolish the *bete noire* of beginners of inlay work. That is, the fear of getting folds in the matrix at the margins. It is of absolutely no consequence, as, if the margins be properly prepared, the folds can be burnished down to the same gauge as the remainder of the matrix. The important consideration is the adaptation of the matrix to the walls and grooves of the cavity and the avoidance of tearing it, and this can be more surely accomplished if the folds at the margins be disregarded.—GEORGE T. BANZET, Chicago, *Review.*

UNIONISM AND DENTISTRY.—According to reports appearing in the press, several dentists of Washington, Pa., recently signified their willingness to form a union, same to be under control of the American Federation of Labor, so as to obtain benefits enjoyed by the brotherhood. The district organizer who had the matter in charge corresponded with the president of the national organization and the answer received was as follows:

"Mr. W. C. Black, Organizer,

"Washington, Pa.

"Dear Sir and Brother: In regard to organizing the dentists, I wish

to state that business men, professional men and employers of labor are not eligible to membership in a local union affiliated with the American Federation of Labor. While a man may not be strictly eligible to membership in a union, yet the fact should by no means debar him from being a trade unionist at heart, in spirit and by action in so far as the conduct of his business is concerned, the weight of his influence is given and his patronage of union-made products is manifested.

"With best wishes, I am,

"Fraternally yours,

"SAMUEL GOMPERS,

"President A. F. of L."

TO REMOVE COATING FROM INSTRUMENTS AFTER BOILING.—The coating which sometimes forms on instruments when boiling may be removed with the following solution:

Prepared chalk	2 oz.
Add ammonia	2 oz.
Alcohol	2 oz.
Water	4 oz.

Rub the instruments with a cloth saturated with the solution. Then wipe them with a dry cloth.—J. Q. BYRAM, Indianapolis, Ind., *Review.*

CEMENT ANCHORAGE FOR METAL FILLINGS.—Using a quantity not too large of a cement setting with moderate quickness, there is a ready and positive fixation of the first pieces of gold. There is no rocking or tipping. The pulp when nearly exposed is protected, weak walls are strengthened, gold is prevented from showing through thin walls, and with skilled manipulation positive anchorage is obtained in cavities in which it would be extremely difficult to pack or retain the gold in any other way. To my mind the putting of metal fillings, and especially amalgam fillings, in cavities without these linings may be compared with a little exaggeration to building a wall of loose bricks, while the combination of the metal and tooth surfaces with the plastic cement layer between is like the walls of bricks, solidly laid in a good quality of mortar.—DR. C. A. BRACKETT, *Brief.*

USE OF DENTAL FLOSS.—Dental floss should be used morning and night. Instruct the patient to grasp the floss between the thumb and forefinger of each hand, using the second finger of each hand as a guide to carry the floss to any part of the oral cavity. Demonstrate this. Bring the floss lightly between the teeth; then draw it back back and forth, when the thread will flatten and readily pass between teeth however close together, if approximal surfaces are smooth.

After placing, etc., it should be moved carefully toward the gums, at the same time keeping it firmly pressed against the tooth, until it is carried to or just underneath the free margin of the gum, then back over the tooth surface to the contact point of the two teeth, and the approximate face of the adjoining tooth treated in like manner. In this way all soft deposits may be removed without injury to the gums.—*D. O. & L.*

ROBBERIES.—Drs. Leake and Kinsella, Lockport, N. Y., Aug. 14; quantity of gold and teeth.—Drs. Snook, Switzer and Hart, Elmira, N. Y., $40.—Dr. Stillman, Lansing, Ia., Aug. 19; $30.—W. H. Smith, Springfield O., Aug. 19; $40.—C. E. Thomas, Aurora, Ill., Aug. 20; $125.—Three dental parlors, Racine, Wis., Aug. 24; $100.—P. F O'Malley and Ida Weiner, Scranton, Pa, Aug. 26; gold from both.—G. F. Ramsey, Milwaukee, Wis., Aug. 28; $100. The thief was caught and is now held for trial.—B. E. Wright and P. S. Langworthy, Portland, Ore., Aug. 28; the contents of their show cases.—Drs. Pealor and P. X. O'Donnell, Hazleton, Pa., Aug. 29; $100 and 15.

"EARACHE" AND THE TEETH.—A physician near here treated a patient for three weeks for earache and neuralgia, but failed to relieve her, except by the use of sedatives. Finally she complained that a lower wisdom tooth felt longer than the rest of her teeth. Her physician came to the conclusion that probably that tooth was the cause of her suffering. I was called in to extract it. She was pillowed and propped up in a Morris chair. Constant pain soon wears down the strongest constitutions, and this woman was certainly in a debilitated condition. She also had a heart affection which did not help matters. Her physician and several of the neighboring women were present. I never wish my competitors bad luck, but I certainly did wish one of them had this case. I got out my "torture goods" and proceeded to remove that tooth in the latest and most scientific manner. I succeeded most beautifully—that is, I broke the tooth the first attempt. After assuring her that the breaking of the tooth would give her as much relief as if I had extracted it, I mustered up enough courage to take a look at the remains. To my surprise I discovered I could remove it quite easily. When I got that tooth out she heaved a sigh of relief, for the pain ceased almost instantly. In a week she could do her own work.—J. A. MCPHAIL, *American Journal of Clinical Medicine.*

DAMAGE SUITS.—Aug. 13 W. W. Tobey, a retired dentist of Danville, Ill., filed a claim for $40,000 damages against the Big Four Railroad. Last May the doctor, in company with three other men, was crossing the defendant's tracks in an automobile, when the party was run into by a passenger train. Tobey received a severe nervous shock, and it is owing to his present condition that he makes his claim.—Aug. 24 a dentist of Springfield, Mo., filed a suit for $5,000 damages against the owners of the premises wherein he had his office. He alleges negligence by the company's employe through leaving the elevator door partially open, when he, believing the car to be there, stepped forward and fell ten feet to the basement. For the injuries received, trouble and expense incurred, he has made his claim.—An action for $1,000 damages for slander has been brought by a Springfield (Mass.) dentist against the manager of a dental company of the same city.—Early in September a Pittsburg (Pa.) dentist figured as defendant in a peculiar suit. It seems that his wife before he married her had contracted a $100 debt for a wooden leg, and now he as her husband has been called upon to meet the claim. As the decision went against him he has carried the case to a higher court.

DENTIN OBTUNDENTS.—Carbolic acid, zinc chlorid, and trichloracetic acid in full strength solutions are the agents which in my hands have proved themselves good friends in dealing with a large proportion of the cases of hypersensitive dentin not amenable to topical treatment. The selected agent is applied on a pledget of cotton to the desiccated and protected cavity, and being covered over with a thick layer of unvulcanized rubber, pressure is applied by means of a flat-ended instrument for a minute or two, when an area of insensitive dentin will ordinarily be found to have been secured. If much depth of excavation is needed a second application will be required. A saturated solution of cocain hydrochlorid may be used in exactly the same way; but the former agents have, I think, the advantage, inasmuch as the diminished sensitivity is permanent, while the cocain anesthesia is of course only temporary.—WM. SIMMS, Dental *Record.*

LEARN TO MANIPULATE.—Ladies and gentlemen, it is the man behind the gun who directs the result. Don't condemn the material. Learn to manipulate it. The enormous amount of poor gold fillings has never condemned gold and pronounced it a poor filling material. Gold has proven to be the most satisfactory permanent filling material. Yet it is sometimes the very worst to use. This is nothing new to you. The choice of a filling material ought to be determined by the dentist, not by the patient. The application of porcelain inlays for restoration of tooth structure and prevention of future caries has great possibilities. Good alloys in the hands of skillful, conscientious operators have proven a blessing to our patients despite the unjust and snobbish condemnation of the gold-bug advocates.

The proper manipulation of dental cements will prove a comfort to a distressed humanity.—DR. D. M. OLNECHT, *Summary.*

THE LABORATORY PLATE BRUSH.—Do you use a brush to cleanse the artificial dentures when you take them from the patient's mouth? Do you use the same brush for everybody? Pleasant thought, isn't it?

Sterilize: Each time the brush is used it should be well washed in running water and then placed in a good antiseptic solution.

Ward's Cyanide of Mercury tablets are most convenient. A pint fruit jar is a convenient receptacle for holding the solution and brush. One tablet placed in the jar of water makes a 1-500th solution. If the brush is frequently used it should be kept in the solution, otherwise the brush should be hung upon a hook to dry after remaining in the solution twenty minutes.

The formula for Alfred Ward's Antiseptic Tablets is:

Mercury Cyanid	.6 grs.
Benzoin	.2 grs.
Sodium Borate (cp)	.9 grs.
Thymol	½ gr.
Carmine, q. s.	

—G. H. W., in *Dental Magazine.*

WATER AS A LOCAL ANESTHETIC.—J. A. Wyeth has become convinced that the Schleich method of anesthesia by the infiltration of weak cocain solutions is due more to the fluid itself than the contained salt. He gives the history of two cases, both men, with small tumors on the back. In both removal was painlessly done under water anesthesia, which acts by pressure on the end organs of the sensory nerves, destroying their sensibility. Ten minims of sterile water were used, the needle resting in the substance of, and not below, the skin. This procedure was repeated in the same continued linear direction, until a sufficient length of anesthetized skin was produced. The needle was thrust between the capsule of the tumor and the subcutaneous areolar tissue, and the water freely injected so as to lift the skin from the tumors, which was separated also by a similar manipulation from the underlying connective tissue.—*New York Medical Journal* (*Brief*).

RETENTION OF PORCELAIN INLAYS.—Make a cylinder of the thinnest platinum foil, a little less in diameter than the depth of the cavity, and as long as can be placed in the bottom of the matrix. Close both ends of the cylinder, place it in the bottom of the matrix, and bake the inlay. When completed, remove the platinum matrix in the usual manner, and you will notice that a hollow tube has been baked in the porcelain. Now take a thin disk, cut into this tube, and with a little care all the platinum can be removed; if necessary with the additional assistance of sharp-pointed explorers. The result will be an inlay with an undercut that cannot be improved upon. The tube can be made on the end of any root-canal plugger or wire of a size suited to the particular case in hand. There is less liability of warping the matrix when these tubes are used, but this should not be the cause of the operation being carried out with less thorough attention to detail.—ORMOND E. WALL, D.D.S., in *Dental Cosmos.*

TAKING LOWER IMPRESSIONS.—A simple but successful way to obtain a plaster impression of the lower ridge is accomplished as follows: Mix the plaster to the consistency of cream, hold the cheek and tongue out of the way, and with a spoon pour the plaster along the ridge, allowing it to run well under and over the ridge. Take your tray filled about two-thirds with plaster and place it into position in the mouth, using only a very light pressure to avoid displacing the muscles and tissue. Remove when hard.

This method is especially effective where the six front teeth are remaining in the mouth, as no special tray is required. Just fill in over the ridge first good and full with the soft plaster, then introduce the moderately filled tray, using little or no pressure. For undercuts, allow impression to break and replace the pieces.

With this method the muscles are not pressed out of their normal position, thus we obtain a more perfect impression with less liability of having to trim our plate when finished.—*Pacific Dental Gazette.*

NOT PAINLESS BUT PAINFUL.—"You pull teeth here, I suppose?" queried the man, after climbing the stairs to the dentist's office.

"Yes, sir."

"Just grab 'em and yank 'em out?"

"We are careful not to hurt."

"Is it the painless kind?"

"Absolutely painless, sir."

"Then I'll call somewhere else."

"But you don't want to be hurt, do you?"

"O, it isn't for me. It is for the old woman. She's got to have eleven pulled at once, and I want it to hurt her so that she won't be able to open her mouth at me for a month of Sundays!"

THOROUGH MASTICATION IN THE TREATMENT OF CHRONIC DISEASES—*By Drs. Monteuuis and Pascault, Paris, France.*—Buccal digestion is the only phase of the general process of digestion which is, strictly speaking, a voluntary act. The buccal organs have a triple function; they triturate the food, regulate the temperature, and insalivate the bolus. Insalivation has to do with the digestion of starch and develops the sapidity of the food. To thorough mastication the authors attribute a very important hygienic and therapeutic role, and are of the opinion that all cases of dyspepsia and autointoxication could be markedly relieved by directing patients to masticate their food so thoroughly that eating would imply in that particular respect a series of exercises in mandibular gymnastics. The authors have found that it is possible to subsist comfortably on a smaller ration, if every particle of food is thoroughly masticated.—*Dental Cosmos.*

ASSAULTS.—W. James Starbuck, a dentist of Boston, Mass., was on April 27 the victim of a peculiar assault with attempt to rob under circumstances which the police say has no parallel in the annals of criminal history. The doctor was descending the stairs leading from his office to the street, and when nearly half way down a man rushed up on all-fours, and, using his head as a ram, butted the dentist between the legs and tossed him over his shoulders down the stairs, and then made a grab for the doctor's diamond pin. Although seriously injured, the dentist fought and prevented the man's escape. While the former has been confined to his bed for fifty-one days, the latter is still in jail awaiting trial.—Aug. 12 two dentists came to blows over the possession of some professional tools at Columbus, O., with the result that one of them had to furnish bail.—Aug. 20 a prominent Baltimore dentist was fined for assaulting another man whom he saw in company with his wife while they were watching the progress of a ball game.—It is reported that the New Ulm (Minn.) dentist who has been tried several times for the murder of a brother dentist has become insane, and is now lodged in a private sanitarium.—A man believing that he had serious grievance against a San Antonio (Fla.) dentist, alleging the wronging of his wife, entered the doctor's office and instantly killed the occupant. The infuriated husband,

who did not know the dentist by sight, had made a sad mistake, for his victim was not the doctor. He has been admitted to bail for $5,000.—Aug. 30 a dentist of Olyphant, Pa., who was accused of cruelty to his son, entered bail in the sum of $1,000.

INDEPENDENT THOUGHTS ON DENTISTS, BY PROF. EISENOSE.—You see that I have been at the dentist's, or rather the dentist has been at me. I was feeling sort of down in the mouth over a poor tooth I had—poverty is no disgrace until it affects your teeth. Well, I had not been at the dentist's very long when I found that he also was feeling down in the mouth over my tooth. Right then and there I settled back in the chair and let him go ahead. I could put my trust in such a sympathetic fellow, even if it was my own mouth he was feeling down in. Well, he injected an expectorating-less spittoon in my mouth and two or three miniature hoes and rakes. Then he tore off two or three yards of cotton stuffing and stuck that in. Then he asked me to please open my mouth just a little wider so he could get his arm in. Just at that juncture I thought of a good joke. I waved my hand and he unloaded all the baggage out of my mouth, and I started to tell the story. But he didn't see the point, so he stuck in a phonograph and ran it backward and it sucked out all my words. At such a bit of dental ingenuity I was speechless. I sat there and thought of home and loved ones and unpaid laundry bills and he worked away on that tooth. He drilled a great deal harder than any member of the 23d regiment has to. And then he came in touch with my telegraph system, whereupon he said I had a good deal of nerve. I wanted to tell him that I had more of that than cash, but I couldn't get the command of my speech. I could only express myself through my feet. "That doesn't hurt you," said the kind man, 'cause he knew I couldn't contradict. Well, before he got through with me, he found more openings in my teeth than there are in a want-ad. column. There was something the matter with every tooth in my head except one—and that I hadn't cut yet.—*New York Business World.*

A UNIVERSAL ANTIDOTE.—A writer in a recent number of the *Pharmaceutical Era* emphasizes the use of milk as a universal antidote applicable to most cases of poisoning. By its fatty matter and its casein, it protects the mucous membrane against the corrosive action of acids, alkalies and other caustic or irritant substances. It not only coagulates under the action of acids, by combining with them, but it also yields a precipitate with most mineral bases, forming insoluble caseates. If precipitation does not immediately take place with a product having a given reaction—acid or basic—this precipitate will appear through the intervention of another substance of contrary reaction. Dr. Crowzel proposes to add to the milk five per cent of sodium borate. This salt is not toxic, and is employed because it precipitates as insoluble borates all the mineral bases, except harmless or slightly poisonous alkaline bases. The poisonous acids decompose it, seizing on the soda and setting free boric acid, which is less poisonous and less soluble. The mixture of sodium borate and milk

is an antidote at once neutralizing and precipitant. It can be used especially with mineral poisons, although we must except cyanids, ferrocyanids, ferricyanids, chlorates, nitrates, arsenites, arsenates and oxalates. Of these, the first three are precipitable by a mixture of ferrous and ferric sulfate, while chlorates and alkaline nitrates cannot be precipitated by any offensive reagent. Arsenites and alkaline arsenates can be eliminated by magnesia. In any case no risk is run, and good may be done by giving milk with sodium borate to one who is thought to have been poisoned. It is the first thing to be done after emptying the stomach. If arsenic is suspected, magnesia should be given. If there are vegetable poisons, the best antidote is a one per cent solution of potassium permanganate.—*Medical News.*

ADRENALIN AND COCAIN IN CROWN WORK.—The astringent power of adrenalin in hemorrhage is almost surprising. Under its use it is now quite possible to operate quickly and neatly, and with much more comfort to the patient than by the older methods. In combination with cocain the dentist has in adrenalin a most useful agent for controlling bleeding and preventing pain. Furthermore, on account of the astringent action of the adrenalin upon the capillary vessels, there is less risk of producing the toxic effect of cocain, for less of it is absorbed. H. Braun, M. D., Leipsic, Germany (*Centralblatt f. Chirurgie,* No. 58), proclaims that experience with several hundred patients has confirmed his previous assertions in regard to the great value of combining adrenalin with cocain. A good combination is two to five drops of the 1-1,000 adrenalin chlorid solution to 100-Cc. of a 1 per cent solution of cocain.

I have been using Parke, Davis & Co.'s hypodermatic tablets, adrenalin and cocain, each of which contains 1-300 grain adrenalin and one-sixth grain of pure cocain crystals. My method has been to apply the crushed tablet to the gum around the tooth upon which I am about to place a gold crown. The effect is a bloodless and painless operation which is much appreciated by the patient. I do not know of any other operator who is using this method and I recommend its more extended trial by members of the profession.—C. P. RICE, York, Pa., in *Dental Register.*

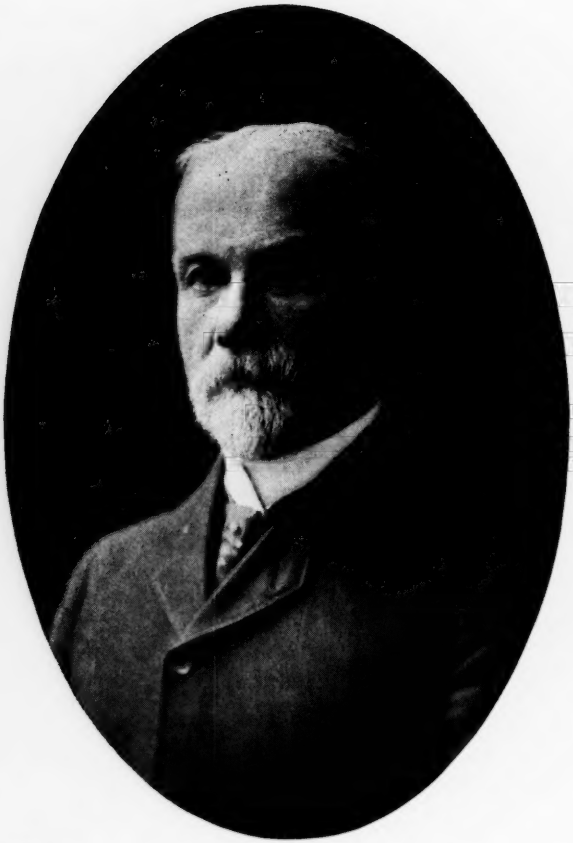
A WASTEFUL LOT.—Dentists are ever ready to complain of the non-remunerative character of their work, charging it up to want of appreciation on the part of the public, the public's inability to place a fair value on the service rendered, and what not. These, with other not easily controlled causes, carry more or less weight in accounting for the chronic impecuniousness of the vast majority of the profession. There are other causes, however, and not the least is our proverbial wastefulness. We have seen dentists, whose financial status was such that they couldn't afford to waste a nickel, throw small clippings of gold on the floor, scatter filings of the same metal about the bench and chair, sweep the grindings of a crown or bridge from the lathe table, and wonder withal why they had failed utterly to get a dollar to the good.

A jeweler in the operating chair happened to see a scrap of foil on the floor, and asked—naturally enough for him, for he works in gold—"What do you do with your 'sweeps,' Doctor?" He got for an answer: "Oh, they don't amount to anything; thrown into the rubbish can, I guess." "That may be well enough for you, but if I couldn't get a suit of clothing a year out of what you seem to waste I'd be greatly disappointed. You men have no appreciation of the value of gold, except perhaps when you buy it."

At a meeting of a near-by local society Dr. F. M. Rood, in a side discussion of this very subject, said he had recently sent to a refiner four ounces of polishing strips and disks for which he received two dollars and forty cents; had he offered the strips to any one of the majority of those present at ten cents a pound it is a question if the offer would have been accepted. And yet the poor men of the profession are throwing away annually strips, disks, filings, clippings, grindings, etc., by the thousands of pounds, a suggestion of which, if done by an employe in a manufacturing jeweler's establishment, would lead to manslaughter in the first degree. And yet we go on wondering why we have to wear last year's hat, shoes run down in the heel, and trousers bewhiskered at the ends of the legs!

Disadvantages of Shell and Band Crowns.—The unfortunate consequences following the use of shell and band crowns are due, first, to the inadequate dressing and shaping of the natural crown, thus necessitating the use of a metal shell, which cannot fit at the cervical margin; and second, the forcing of the edge of the shell so far under the free margin of the gum as to impinge upon the pericementum and adjacent soft tissues. In the first case, the margin of the shell, standing away from the neck of the tooth at all points, furnishes a shelf for the accumulation of food debris and stagnant secretions, which inevitably results in the girdling of the tooth by caries; and in the second case, the soft tissues impinged upon become irritated and recede, or an inflammation is set up which very frequently leads to the establishment of a pyorrheal condition. In either case the tooth is eventually lost.

All that has here been said in regard to the ill-fitting or ill-placing of the margin of the shell crown applies equally to any band encircling the neck of the tooth, no matter what kind of a crown be attached to it. It is the observation of the ill results of the misfit band that has led to the present outcry against the use of bands in any form. Some recent writers even go so far as to declare that any band extending under the gum margin, no matter how well fitted and adapted, is in all cases a source of irritation, and therefore objectionable. Probably this is a swinging of the pendulum too far in the opposite direction, but those who now object to the use of bands certainly have some justification for their views, when we consider the immense amount of harm that has resulted from their improper use.—S. H. Guilford, *Stomatologist.*



Yours truly
C. R. Taylor